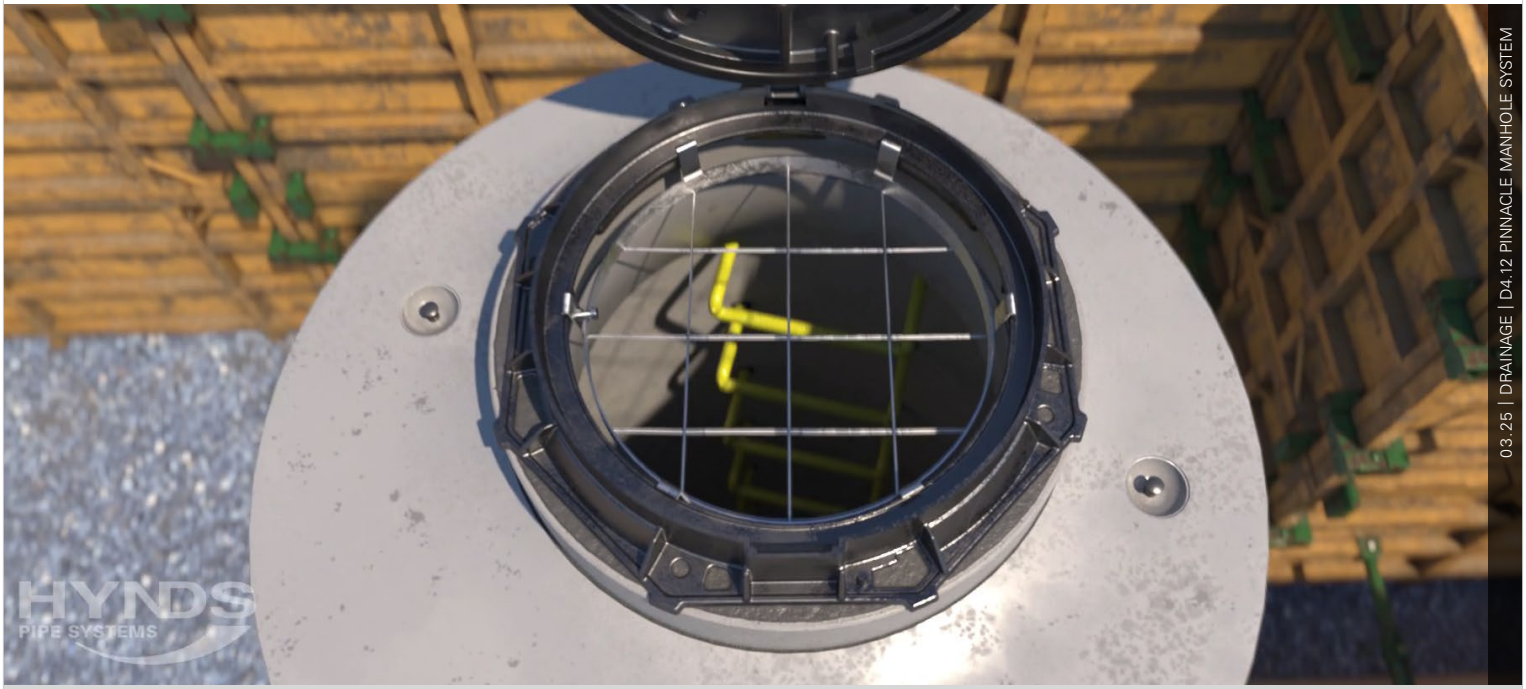
PINNACLE

Pinnacle® Manhole System

(North Island only)

Technical Guide D4.12

Manufactured at our state of the art world leading concrete manufacturing plant in Pokeno, the "Pinnacle® Manhole System" has an improved riser joint and easy fit manhole steps to increase speed of installation.



Applications

- Stormwater and Wastewater Manholes
- Drop manholes
- Pipeline junctions
- Pipeline direction changes
- Catchment inlet structures

Product Attributes

- PE encapsulated manhole steps
- Strong and durable
- Monolithic base
- Watertight rubber ring joint
- Accurate dimensions
- Lid and cover options to suit various load requirements

Approvals/ Standards

- Designed to CPAA guidelines - loads on circular precast manholes
- Rubber rings are manufactured in accordance with AS 1646:2000

Sustainability

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

Quality/Environment/Health & Safety

ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018

HYNDS
PIPE SYSTEMS

Introduction

The Pinnacle Manhole System range is our new and improved range of Concrete Manholes from our state-of-the-art, world leading concrete manufacturing site in Pokeno, Auckland

The automated manufactured range of Pinnacle Manholes is manufactured using a highly automated process utilising the latest European manufacturing technology. This state-of-the-art process helps ensure that a high-quality manhole is produced consistently, with smooth surface finishes and precision dimensional accuracy especially around the Joint profile.

The larger diameter and custom manholes in our Pinnacle Manhole Range are manufactured using the latest European Mould technology ensuring that the product meets our strict quality requirements.

The new Pinnacle range includes three new innovative features:

1. The Hynds Pinnacle® Manhole range incorporates Hynds' new Pinnacle® PE encapsulated manhole steps. The Pinnacle® Manhole Step offers a wide range of benefits to both the asset owner and the installer. They are completely watertight, safer to install and use, and provide increased durability. Refer to Technical Guide D4.15 Hynds Pinnacle® Manhole Steps for further product details and installation guide.
2. A new joint profile that can accommodate traditional mastic joint or a new special rubber ring. This provides a watertight joint option for everyday applications.
3. A pre-lubricated rubber seal joint for high performance in more non-standard applications.

Our Pinnacle Manhole range is generally only supplied to North Island projects but can be shipped to South Island projects where required.

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.

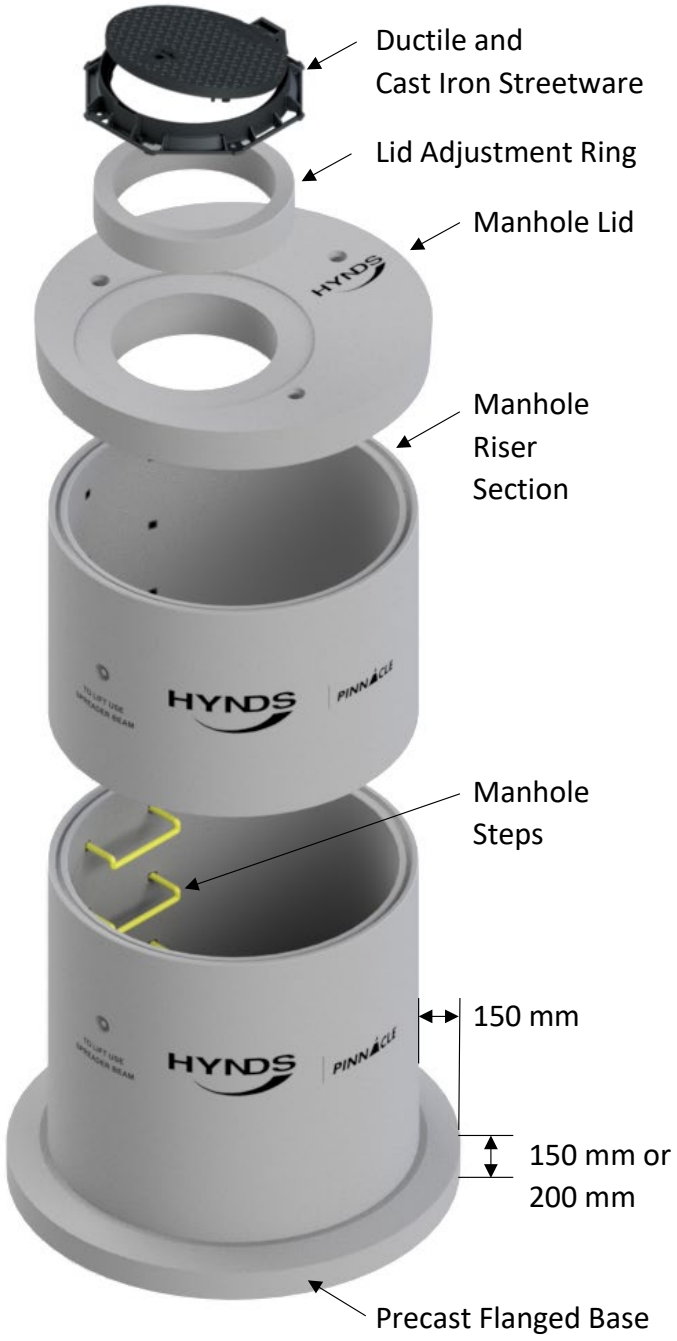


FIG. 2 Schematic elevation of Hynds Manhole System.

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 (H2S), 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

Pinnacle range Flanged Bases are available in a range of heights for each diameter. Our 1050 and 1200 diameter Flange bases have the riser and base cast in one pour, eliminating the joint between base and riser. Flanged bases for 1350 to 3200mm diameter are manufactured in a 2-stage pour and incorporate a Hydrophilic seal in the base for watertightness.

Refer to Table 4 & 5 for full list of our Pinnacle Manhole Base Range.

Manhole Riser

Our Pinnacle range Manhole Risers are manufactured to AS/NZS 4058:2007 and are suitable for most installations.

1. **Universal Joint**
   Pinnacle Manhole Risers *(& Bases)* in diameters 1050, 1200, 1350 and 2020mm incorporate the new universal joint profile. The groove in this joint allows for a rubber ring to be placed and then compressed by the weight of concrete units above the joint. The use of the rubber ring between the joint increases watertightness and prevents infiltration. This is designed to provide a watertight hydraulic seal up to an external pressure of 50kPa *(5 metre head)*. Alternatively, traditional butyl mastic can be used with the universal joint.

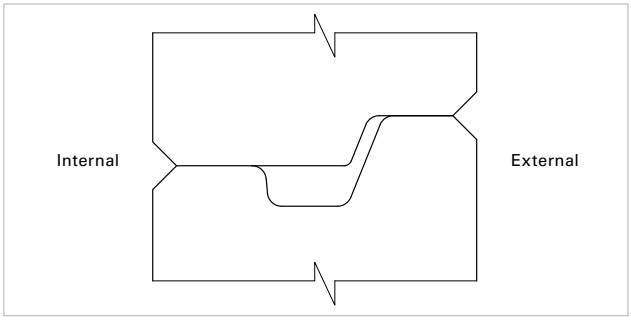


FIG. 3 Universal Joint profile

2. **In Wall Joint**
   Pinnacle Manhole Risers *(& Bases)* with diameters 1500 and 1800mm incorporate an in-wall joint with a pre-lubricated rubber ring. As well as standard applications this joint can be used for some special applications such as high-water tables, wastewater applications, and for high axial loads.

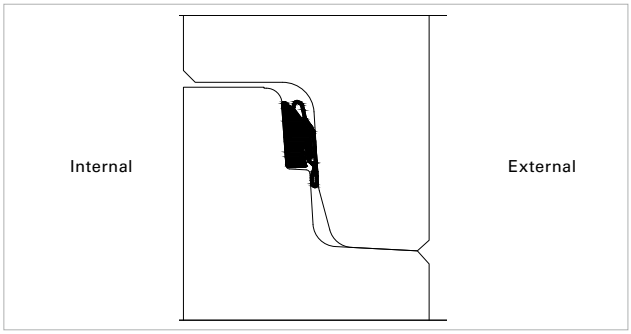


FIG. 4 In Wall Joint profile

3. **Mortar Joint profile**
   Pinnacle Manhole Risers *(& Bases)* with diameters 2300mm and greater incorporate a traditional 'Mortar Joint'.
   This joint profile is sealed with standard mastic sealant or epoxy mortar and which has been proven over time. The recommended products to be used for sealing this joint profile are:
   a. Grey Butyl Manhole Sealant – Hynds (SM9020). This product does not have a 'memory' and provides a flexible joint. It has a moderate amount of surface tack making it easier to pull the joint apart, if required.
   b. Black Butyl Mastic Manhole Sealant – Hynds (MSR). This has 'memory' and provides a more robust joint. It has a stronger bond to the concrete faces, making it more difficult to pull the joint apart. Hynds recommends this sealant for installations with high water tables.
   c. Epoxy Mortar – Hynds (Hybond). This is a two part epoxy mortar which will result in a rigid joint. It is commonly used for patching concrete as well as to joint concrete components such as in bends and off-takes.

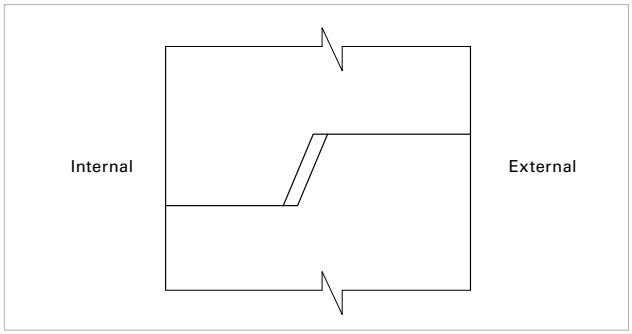
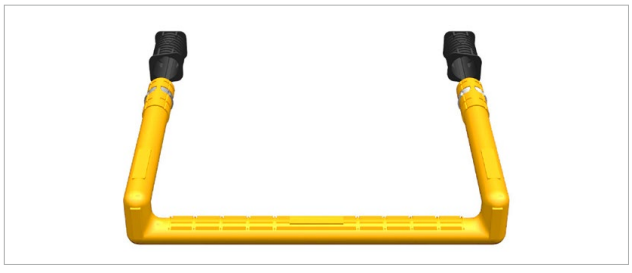


FIG. 5 Mortar Joint profile

Manhole Steps

These manhole steps are easily installed by pushing into precast inserts into the manhole wall.



The Pinnacle® Step has a galvanised steel core and is coated with industrial grade polyethelene.

It is manufactured and tested to EN1301 European Standard and AS 4198:1994. The Pinnacle manhole step is suitable for stormwater and wastewater applications and is available with 1050 - 2020mm diameter manholes.

For manholes with a diameter of 2300mm and larger, up to 3200mm, galvanised stainless steel steps are used due to a traditional manufacturing method that permits only steel steps. These steps are well-suited for both wastewater and stormwater applications, offering enhanced resistance to corrosion. They are installed through preformed holes in the riser wall, with the nuts tightened from the outside to compress rubber pads between the washers.

TABLE 1 Manhole Steps to fit Pinnacle® risers

Nominal Internal Diameter	PE Encap Galv. push in step
1050	STEPPENCAPGALV
1200	STEPPENCAPGALV
1350	STEPPENCAPGALV
1500	STEPPENCAPGALV
1800	STEPPENCAPGALV
2020	STEPPENCAPGALV
2300	STEPGSL
2550	STEPGSL
3000	STEPGSL
3200	STEPGSL

These steps are set at 300 mm intervals within the riser sections, with the first step placed 150 mm down from the top of the riser.

The PE encapsulated step is easily installed by pushing the step into manhole risers which are manufactured with precast inserts cast to the wall of the riser. The step locks into place with a locking ring and there is no need to tighten nuts from the outside which makes installation much quicker and safer.

The plastic step insert does not penetrate the wall providing a leak free manhole step connection. For more information and retrofitting guidance see Technical Guide D4.15 Hynds PE Encapsulated Manhole Steps.

Manhole Lid

Pinnacle® Manhole Lids are designed and manufactured in accordance with CPAA Guidelines, NZS 3101, NZS 3109 and the NZ Bridge Design Manual. Hynds manufacture a wide range of precast concrete manhole lids to suit manholes from 1050 mm Ø to 3200 mm Ø. These are designed for the following specific load ratings:

Load Type	Description	Load Rating (kN)
5kPa	Pedestrian- Footpaths, non traffic areas (1050 Ø only)	5kPa Wheel Load
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 lids vary in thickness from 100 mm to 225 mm depending on the manhole size and load rating.

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. Our manhole cover and frames come in a range of diameters and load ratings. The load rating can range from 10kN to 900kN and are designated in classes. The rating of the cover and frame is not the same as the rating of the manhole lid.

FIG. 6 Cast Iron Cover and Frame Ø540 mm rated to 80kN

FIG. 7 Ductile Iron Maestro Cover and Frame Ø600 mm rated to 400 kN

Note: *For the full range of access safety grilles, covers and frames please contact your local Hynds Branch or see the Hynds Streetware Catalogue on our website.*

Manhole Scruffy Domes, Grills and Landing Platforms

Fixed galvanised steel ladders complete with lift-up sections are available for pump stations or manhole off-takes. Hynds galvanised landing platforms are designed for bolting to the internal riser wall and are recommended for positioning every 3 – 5 metres of depth (depending upon service procedures and fall arrest requirements). Hynds galvanised grills and scruffy domes are designed for bolting on top of the riser to prevent unauthorised entry.

Note: *Refer to Technical Guide D5.14 for more information on Scruffy Domes.*

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 cut out. Working from outside the flanged base, cut the smallest possible hole diameter *(pipe O.D. + 50 mm)*

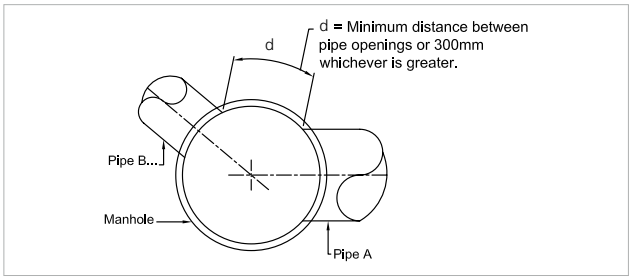


FIG. 8 Manhole/Pipe selection and minimum distance between pipes

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)
     Example:
     Ø1050 pipe O.D.= 1218 mm;
     d = 0.75 x 1218 mm = 914 mm
     Therefore, the required minimum distance in the horizontal plane between pipes is the max between 914 mm and 300 mm; i.e. 914 mm.
   - When un-equal sized pipes:
     300 mm or d = 0.65 x largest pipe O.D.
     (whichever is greater)
     Example:
     Ø675 pipe O.D.= 779 mm and Ø1050 pipe O.D.= 1218 mm; d = 0.65 x 1218 mm = 792 mm
     Therefore, the required minimum distance in the horizontal plane between pipes is the max between 792 mm and 300 mm; i.e. 792 mm.

FIG. 1 Manhole Connector for PVC pipe

For connection of rigid pipe materials (vitrified clay and concrete) epoxy or cement mortar should be used.

For connection of PVC pipe materials, Hynds Pipe Systems supply purpose made manhole connectors in 100 mm and 150 mm diameters. These sealed units are made up of a BS EN 295 vitrified clay pipe short coupled to a PVC short and then held together with a patented heat shrink process to ensure that the connectors cannot come apart when being installed. The clay pipe short is epoxied to the concrete manhole riser wall. Manhole structures installed in regions prone to settlement should be fitted with pipe shorts prior to installing the connected pipeline. Manhole shorts are not recommended for pipes above 675 mm internal diameter.

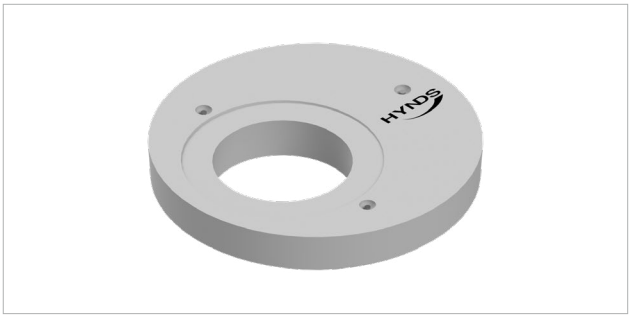


FIG. 9 Pinnacle® Concrete Lid Diagram

TABLE 2 Pinnacle® Concrete Lid Geometry

Lid Diameter (mm)	**Opening Type**	**Thickness** (mm)	**Loading**	**Mass of Lid** (kg)	**Swiftlift Lifting Clutch Size** (Tonne)	**Hynds Product Code**	**Standard/ MTO**
1050	Ø535 Hole Offset	100	5kPa	269	1.3	MHL10100P5W	MTO
	Ø535 Hole Offset	200	HN-HO-72	548	1.3	MHL10200HN5W	Standard
	Ø605 Hole Offset	150	HD60	353	1.3	MHL10150HD6W	Standard
	Ø605 Hole Offset	200	HN-HO-72	516	1.3	MHL10200HN6W	Standard
	Ø535 Hole Centre	100	5kPa	269	1.3	MHL10100P5HCW	MTO
	Ø535 Hole Centre	200	HN-HO-72	548	1.3	MHL10200HN5HCW	MTO
	Ø605 Hole Centre	200	HN-HO-72	516	1.3	MHL10200HN6HCW	MTO
	Closed	100	5kPa	326	1.3	MHL10100PCLW	MTO
	Closed	150	HD60	493	1.3	MHL10150HDCLW	MTO
	Closed	200	HN-HO-72	662	1.3	MHL10200HNCLW	MTO
1200	Ø535 Hole Offset	200	HN-HO-72	716	1.3	MHL12200HN5W	Standard
	Ø605 Hole Offset	150	HD60	509	1.3	MHL12150HD6W	Standard
	Ø605 Hole Offset	200	HN-HO-72	684	1.3	MHL12200HN6W	Standard
	Ø535 Hole Centre	150	HD60	533	1.3	MHL12150HD5HCW	MTO
	Ø535 Hole Centre	200	HN-HO-72	716	1.3	MHL12200HN5HCW	MTO
	Ø605 Hole Centre	150	HD60	509	1.3	MHL12150HD6HCW	MTO
	Ø605 Hole Centre	200	HN-HO-72	684	1.3	MHL12200HN6HCW	MTO
	Closed	150	HD60	619	1.3	MHL12150HDCLW	MTO
	Closed	200	HN-HO-72	831	1.3	MHL12200HNCLW	MTO
1350	Ø535 Hole Offset	200	HN-HO-72	913	1.3	MHL13200HN5W	Standard
	Ø605 Hole Offset	150	HD60	655	1.3	MHL13150HD6W	Standard
	Ø605 Hole Offset	200	HN-HO-72	882	1.3	MHL13200HN6W	Standard
	Ø605 Hole Centre	200	HN-HO-72	882	1.3	MHL13200HN6HCW	MTO
	Closed	200	HN-HO-72	1028	1.3	MHL13200HNCLW	MTO
1500	Ø605 Hole Offset	150	HD60	809	2.5	MHL15150HD6W	MTO
	Ø605 Hole Centre	200	HN-HO-72	1087	2.5	MHL15200HN6HCW	MTO
	Ø605 Hole Offset	200	HN-HO-72	1054	2.5	MHL15200HN6W	Standard
	Ø710 Hole Offset	200	HN-HO-72	1026	2.5	MHL15200HN7W	MTO
	Closed	200	HN-HO-72	1187	2.5	MHL15200HNCLW	MTO
1500 Sealed	Ø600 Hole Offset	150	HD60	1038	2.5	MHL15150HD6SW	MTO
	Ø600 Hole Offset	200	HN-HO-72	1346	2.5	MHL15200HN6SW	MTO
	Ø710 Hole Offset	200	HN-HO-72	1291	2.5	MHL15200HN7SW	MTO
	Ø600 Hole Centre	200	HN-HO-72	1346	2.5	MHL15200HN6HCSW	MTO
	Closed	200	HN-HO-72	1493	2.5	MHL15200HNCLSW	MTO

TABLE 2 Pinnacle® Concrete Lid Geometry

Lid Diameter (mm)	Opening Type	Thickness (mm)	Loading	Mass of Lid (kg)	Swiftlift Lifting Clutch Size (Tonne)	Hynds Product Code	Standard/ MTO
1800	Ø605 Hole Offset	150	HD60	1191	2.5	MHL18150HD6W	MTO
	Ø605 Hole Offset	200	HN-HO-72	1559	2.5	MHL18200HN6W	Standard
	Ø605 Hole Centre	200	HN-HO-72	1598	2.5	MHL18200HN6HCW	MTO
	Ø710 Hole Offset	200	HN-HO-72	1511	2.5	MHL18200HN7W	MTO
	Closed	200	HN-HO-72	2573	2.5	MHL18200HNCLW	MTO
1800 Sealed	Ø600 Hole Offset	150	HD60	1436	2.5	MHL18150HD6SW	MTO
	Ø600 Hole Offset	200	HN-HO-72	1876	2.5	MHL18200HN6SW	MTO
	Ø710 Hole Offset	200	HN-HO-72	1821	2.5	MHL18200HN7SW	MTO
	Ø600 Hole Centre	200	HN-HO-72	1876	2.5	MHL18200HN6HCSW	MTO
	Closed	200	HN-HO-72	2022	2.5	MHL18200HNCLSW	MTO
2020	Ø605 Hole Offset	200	HD60	1979	2.5	MHL20200HD6W	MTO
	Ø605 Hole Offset	225	HN-HO-72	2226	2.5	MHL20225HN6W	Standard
	Ø710 Hole Offset	225	HN-HO-72	2165	2.5	MHL20225HN7W	MTO
	Ø605 Hole Centre	225	HN-HO-72	2226	2.5	MHL20225HN6HCW	MTO
	Closed	225	HN-HO-72	2392	2.5	MHL20225HNCLW	MTO
2300	Ø600 Hole Offset	225	HN-HO-72	2820	1.3	MHL23225HN6W	Standard
	Ø600 Hole Offset	200	HD60	2495	1.3	MHL23200HD6W	MTO
	Ø710 Hole Offset	225	HN-HO-72	2754	1.3	MHL23225HN7W	MTO
	Ø600 Hole Centre	225	HN-HO-72	2820	1.3	MHL23225HN6HCW	MTO
	Closed	225	HN-HO-72	2976	1.3	MHL23225HNCLW	MTO
2550	Ø600 Hole Offset	225	HN-HO-72	3480	1.3	MHL25225HN6W	Standard
	Ø600 Hole Offset	200	HD60	3069	1.3	MHL25200HD6W	MTO
	Ø710 Hole Offset	225	HN-HO-72	3430	1.3	MHL25225HN7W	MTO
	Ø600 Hole Centre	225	HN-HO-72	3480	1.3	MHL25225HN6HCW	MTO
	Closed	225	HN-HO-72	3636	1.3	MHL25225HNCLW	MTO
3000	Ø605 Hole Offset	200	HD60	4220	2.5	LD30200HD6	MTO
	Ø605 Hole Offset	225	HN-HO-72	4770	2.5	LD30225HN6	Standard
	Ø710 Hole Offset	225	HN-HO-72	-	-	LD30225HN7	MTO
	Ø605 Hole Centre	225	HN-HO-72	4770	2.5	LD30225HN6HC	MTO
	Closed	225	HN-HO-72	-	-	LD30225HNCL	MTO
3200	Ø600 Hole Offset	225	HN-HO-72	5426	2.5	MHL32225HN6W	MTO
	Ø600 Hole Offset	200	HD60	4836	2.5	MHL32200HD6W	MTO
	Ø710 Hole Offset	225	HN-HO-72	5363	2.5	MHL32225HN7W	MTO
	Ø600 Hole Centre	225	HN-HO-72	5426	2.5	MHL32225HN6HCW	MTO
	Closed	225	HN-HO-72	5585	2.5	MHL32225HNCLW	MTO

FIG. 10 Pinnacle® Riser Diagram

TABLE 3 **Pinnacle® Riser Geometry**

Nominal & Internal Diameter (mm)	**Nominal Height** (mm)	**External Diameter** (mm)	**Internal Height** (mm)	**Standard Wall Thickness** (mm)	**Mass of Riser** (kg)	**Swiftlift Lifting Clutch Size** (Tonne)	**Hynds Product Code**	**Standard/ MTO**
1050	150	1186	150	68	89	1.3	MHR100150M	Standard
	300	1186	300	68	181	1.3	MHR100300M	Standard
	600	1186	600	68	361	1.3	MHR100600M	Standard
	900	1186	900	68	544	1.3	MHR100900M	Standard
	1200	1186	1200	68	727	1.3	MHR101200M	Standard
	1500	1186	1500	68	908	1.3	MHR101500M	Standard
	1800	1186	1800	68	1091	1.3	MHR101800M	Standard
	2100	1186	2100	68	1274	1.3	MHR102100M	Standard
	2400	1186	2400	68	1454	1.3	MHR102400M	Standard
1200	300	1340	300	70	212	2.5	MHR120300M	Standard
	600	1340	600	70	426	2.5	MHR120600M	Standard
	900	1340	900	70	637	2.5	MHR120900M	Standard
	1200	1340	1200	70	851	2.5	MHR121200M	Standard
	1500	1340	1500	70	1065	2.5	MHR121500M	Standard
	1800	1340	1800	70	1279	2.5	MHR121800M	Standard
	2100	1340	2100	70	1491	2.5	MHR122100M	Standard
	2400	1340	2400	70	1705	2.5	MHR122400M	Standard
1350	300	1502	300	76	257	2.5	MHR130300W	Standard
	600	1502	600	76	517	2.5	MHR130600W	Standard
	900	1502	900	76	777	2.5	MHR130900W	Standard
	1200	1502	1200	76	1037	2.5	MHR131200W	Standard
	1500	1502	1500	76	1299	2.5	MHR131500W	Standard
	1800	1502	1800	76	1559	2.5	MHR131800W	Standard
	2100	1502	2100	76	1819	2.5	MHR132100W	Standard
	2400	1502	2400	76	2079	2.5	MHR132400W	Standard
1500	300	1653	300	76.5	295	5	MHR150300W	Standard
	600	1653	600	76.5	580	5	MHR150600W	Standard
	900	1653	900	76.5	880	5	MHR150900W	Standard
	1200	1653	1200	76.5	1156	5	MHR151200W	Standard
	1500	1653	1500	76.5	1433	5	MHR151500W	Standard
	1800	1653	1800	76.5	1734	5	MHR151800W	Standard
	2100	1653	2100	76.5	2009	5	MHR152100W	Standard
	2400	1653	2400	76.5	2016	5	MHR152400W	Standard
1500 Sealed	300	1740	300	120	460	5	MHR150300SW	MTO
	600	1740	600	120	930	5	MHR150600SW	MTO
	900	1740	900	120	1400	5	MHR150900SW	MTO
	1200	1740	1200	120	1870	5	MHR151200SW	MTO
	1500	1740	1500	120	2342	5	MHR151500SW	MTO
	1800	1740	1800	120	2800	5	MHR151800SW	MTO
	2100	1740	2100	120	3270	5	MHR152100SW	MTO
	2400	1740	2400	120	3730	5	MHR152400SW	MTO

TABLE 3 Pinnacle® Riser Geometry

Nominal & Internal Diameter (mm)	Nominal Height (mm)	External Diameter (mm)	Internal Height (mm)	Standard Wall Thickness (mm)	Mass of Riser (kg)	Swiftlift Lifting Clutch Size (Tonne)	Hynds Product Code	Standard/ MTO
1800	300	1978	300	89	407	5	MHR180300W	Standard
	600	1978	600	89	810	5	MHR180600W	Standard
	900	1978	900	89	1213	5	MHR180900W	Standard
	1200	1978	1200	89	1617	5	MHR181200W	Standard
	1500	1978	1500	89	2020	5	MHR181500W	Standard
	1800	1978	1800	89	2423	5	MHR181800W	Standard
	2100	1978	2100	89	2802	5	MHR182100W	Standard
	2400	1978	2400	89	3205	5	MHR182400W	Standard
1800 Sealed	300	2050	300	125	566	5	MHR180300SW	MTO
	600	2050	600	125	1151	5	MHR180600SW	MTO
	900	2050	900	125	1735	5	MHR180900SW	MTO
	1200	2050	1200	125	2319	5	MHR181200SW	MTO
	1500	2050	1500	125	2900	5	MHR181500SW	MTO
	1800	2050	1800	125	3484	5	MHR181800SW	MTO
	2100	2050	2100	125	4069	5	MHR182100SW	MTO
	2400	2050	2400	125	4653	5	MHR182400SW	MTO
2020	300	2224	300	102	521	5	MHR200300W	Standard
	600	2224	600	102	1047	5	MHR200600W	Standard
	900	2224	900	102	1573	5	MHR200900W	Standard
	1200	2224	1200	102	2098	5	MHR201200W	Standard
	1500	2224	1500	102	2624	5	MHR201500W	Standard
	1800	2224	1800	102	3150	5	MHR201800W	Standard
	2100	2224	2100	102	3676	5	MHR202100W	Standard
	2400	2224	2400	102	4202	5	MHR202400W	Standard
2300	500	2580	500	140	1368	10	R23000.5	MTO
	700	2580	700	140	1915	10	R23000.7	MTO
	1200	2580	1200	140	3284	10	R23001.2	MTO
	1900	2580	1900	140	5199	10	R23001.9	MTO
	2400	2580	2400	140	6567	10	R23002.4	MTO
2550	400	2850	400	150	1296	10	R25500.4	MTO
	500	2850	500	150	1620	10	R25500.5	MTO
	900	2850	900	150	2916	10	R25500.9	MTO
	1500	2850	1500	150	4859	10	R25501.5	MTO
	1900	2850	1900	150	6155	10	R25501.9	MTO
	2000	2850	2000	150	6479	10	R25502.0	MTO
	2400	2850	2400	150	7775	10	R25502.4	MTO
3000	600	3308	600	150	2300	10	R30000.6NI	MTO
	900	3308	900	150	3450	10	R30000.9NI	MTO
	1500	3308	1500	150	5750	10	R30001.5NI	MTO
	1800	3308	1800	150	6900	10	R30001.8NI	MTO
	2400	3308	2400	150	9018	10	R30002.4NI	MTO
3200	1000	3520	1000	160	4339	10	R32001.0	MTO

Notes:

- *Thick wall and Extra thick wall versions may be available, please contact your nearest Hynds Pipe Systems Branch.*
- *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.*

FIG. 11 Pinnacle® Flanged Base Diagram

TABLE 4 **Pinnacle® Flange Base Geometry**

Nominal & Internal Diameter (mm)	**Nominal Height** (mm)	**External Diameter** (mm)	**Internal Height** (mm)	**External Height** (mm)	**Wall Thick-ness** (mm)	**Base Thickness** (mm)	**Mass of Riser & Base** (kg)	**Swiftlift Lifting Clutch Size** (Tonne)	**Hynds Product Code**	**Standard/ MTO**
1050	450	1186	450	610.5	68	150	905	1.3	MHF10045015M	Standard
	600	1186	600	760.5	68	150	997	1.3	MHF10060015M	Standard
	900	1186	900	1060.5	68	150	1177	1.3	MHF10090015M	Standard
	1200	1186	1200	1360.5	68	150	1361	1.3	MHF10120015M	Standard
	1500	1186	1500	1660.5	68	150	1544	1.3	MHF10150015M	Standard
	1800	1186	1800	1960.5	68	150	1725	1.3	MHF10180015M	Standard
	2100	1186	2100	2260.5	68	150	1908	1.3	MHF10210015M	Standard
	2400	1186	2400	2560.5	68	150	2091	1.3	MHF10240015M	Standard
1200	1200	1340	1200	1360.5	70	150	1625	2.5	MHF12120015M	Standard
	1500	1340	1500	1660.5	70	150	1839	2.5	MHF12150015M	Standard
	1800	1340	1800	1960.5	70	150	2053	2.5	MHF12180015M	Standard
	2100	1340	2100	2260.5	70	150	2267	2.5	MHF12210015M	Standard
	2400	1340	2400	2560.5	70	150	2482	2.5	MHF12240015M	Standard
1350	900	1502	750	960.5	76	200	2080	2.5	MHF13090020W	Standard
	1200	1502	1050	1260.5	76	200	2338	2.5	MHF13120020W	Standard
	1500	1502	1350	1560.5	76	200	2600	2.5	MHF13150020W	Standard
	1800	1502	1650	1860.5	76	200	2860	2.5	MHF13180020W	Standard
	2100	1502	1950	2160.5	76	200	3120	2.5	MHF13210020W	Standard
	2400	1502	2250	2460.5	76	200	3380	2.5	MHF13240020W	Standard
1500	1200	1653	1200	1375	76.5	175	2450	5	MHF151200W	Standard
	1500	1653	1500	1675	76.5	175	2752	5	MHF151500W	Standard
	1800	1653	1800	1975	76.5	175	3030	5	MHF151800W	Standard
	2100	1653	2100	2275	76.5	175	3307	5	MHF152100W	Standard
	2400	1653	2400	2575	76.5	175	3609	5	MHF152400W	Standard
1800	1200	1978	1200	1375	89	175	3374	5	MHF181200W	Standard
	1500	1978	1500	1675	89	175	3777	5	MHF181500W	Standard
	1800	1978	1800	1975	89	175	4180	5	MHF181800W	Standard
	2100	1978	2100	2275	89	175	4583	5	MHF182100W	Standard
	2400	1978	2400	2575	89	175	4986	5	MHF182400W	Standard

TABLE 4 **Pinnacle® Flange Base Geometry**

Nominal & Internal Diameter (mm)	**Nominal Height** (mm)	**External Diameter** (mm)	**Internal Height** (mm)	**External Height** (mm)	**Wall Thick-ness** (mm)	**Base Thickness** (mm)	**Mass of Riser & Base** (kg)	**Swiftlift Lifting Clutch Size** (Tonne)	**Hynds Product Code**	**Standard/ MTO**
1500 Sealed	900	1740	747	947	120	200	2830	5	MHF15090020SW	MTO
	1200	1740	1047	1247	120	200	3300	5	MHF15120020SW	MTO
	1500	1740	1347	1547	120	200	3770	5	MHF15150020SW	MTO
	1800	1740	1647	1847	120	200	4230	5	MHF15180020SW	MTO
	2100	1740	1947	2147	120	200	4700	5	MHF15210020SW	MTO
	2400	1740	2247	2447	120	200	5170	5	MHF15240020SW	MTO
1800 Sealed	1200	2050	1047	1247	125	200	4230	5	MHF18120020SW	MTO
	1500	2050	1347	1547	125	200	4810	5	MHF18150020SW	MTO
	1800	2050	1647	1847	125	200	5390	5	MHF18180020SW	MTO
	2100	2050	1947	2147	125	200	5970	5	MHF18210020SW	MTO
	2400	2050	2247	2447	125	200	6540	5	MHF18240020SW	MTO
2020	1200	2224	1050	1260.5	102	200	4650	5	MHF20120020W	Standard
	1500	2224	1350	1560.5	102	200	5176	5	MHF20150020W	Standard
	1800	2224	1650	1860.5	102	200	5702	5	MHF20180020W	Standard
	2100	2224	1950	2160.5	102	200	6228	5	MHF20210020W	Standard
	2400	2224	2250	2460.5	102	200	6754	5	MHF20240020W	Standard
2300	500	2580	350	550	140	200	4718	10	FB23000.5200	MTO
	700	2580	550	750	140	200	5265	10	FB23000.7200	MTO
	1200	2580	1050	1250	140	200	8002	10	FB23001.2200	MTO
	1900	2580	1750	1950	140	200	8549	10	FB23001.9200	MTO
	2400	2580	2250	2450	140	200	9917	10	FB23002.4200	MTO
2550	400	2850	250	450	150	200	5345	10	FB25500.4200	MTO
	500	2850	350	550	150	200	5671	10	FB25500.5200	MTO
	900	2850	750	950	150	200	5965	10	FB25500.9200	MTO
	1500	2850	1350	1550	150	200	8908	10	FB25501.5200	MTO
	1900	2850	1750	1950	150	200	10204	10	FB25501.9200	MTO
	2000	2850	1850	2050	150	200	10528	10	FB25502.0200	MTO
	2400	2850	2250	2450	150	200	11824	10	FB25502.4200	MTO
3000	600	3308	450	650	150	200	6319	10	FB30000600NI	MTO
	900	3308	750	950	150	200	8856	10	FB30000.9200NI	MTO
	1500	3308	1350	1550	150	200	11156	10	FB30001.5200NI	MTO
	1800	3308	1650	1850	150	200	12306	10	FB30001.8200NI	MTO
	2400	3308	2250	2450	150	200	14603	10	FB30002.4200NI	MTO
3200	1000	3520	850	1050	160	200	10270	10	FB32001000.200	MTO

Notes:

- *Thick wall and Extra thick wall versions may be available, please contact your nearest Hynds Pipe Systems Branch.*
- *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.*

Lifting & Handling

All Pinnacle manhole lids, risers and flanged bases incorporate Swiftlift lifting anchors for safe lifting and must be used with the correct lifting clutch.

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.

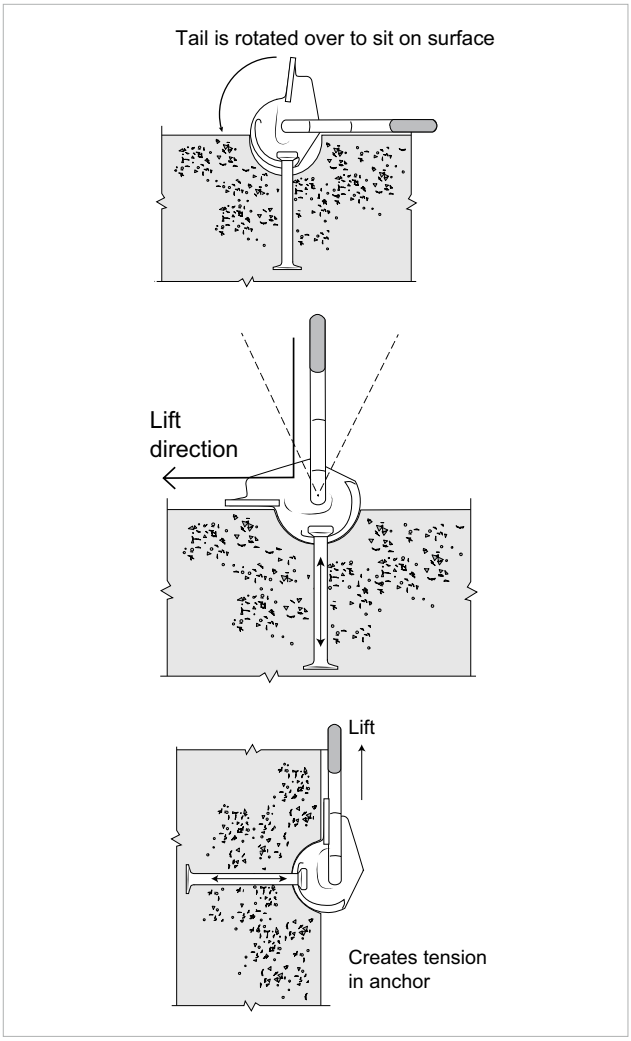


FIG. 12 Swiftlift™ Clutch Operation

Effective Rigging and Sling Angles

How Swiftlift™ lifting clutches work:

- The lifting clutch is attached to the Swiftlift™ 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.

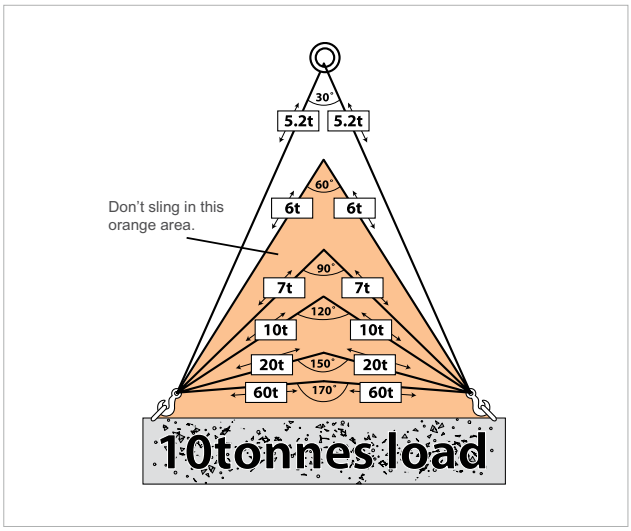


FIG. 13 Sling Angles

- 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.

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 Swiftlift™ 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.

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.*

Manhole Installation

Manholes are installed using modern excavation equipment and techniques. Manholes are generally installed prior to the pipelines connecting into them. The manhole foundation should be prepared with compacted hardfill to prevent excessive settlement. A manhole structure may be constructed as follows:

1. Consider site specific health and safety requirements (check flanged/internal base does not contain water or any other items, which may increase the weight of the unit).
2. Fix steps into riser components.
3. Prepare holes for connections *(see connections)* and lower flange base unit into place using a spreader beam and appropriate lifting equipment.
4. Place appropriate joint seal continuously around the joint circumference *(collar end)*.
5. Place the next riser section *(using a spreader beam and appropriate lifting equipment)*.
6. Make and seal pipeline connections.
7. Bench invert as required.
8. Place and seal the manhole lid.
9. Place and mortar seal lid adjustment rings to required level.
10. Position access frame and cover.

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)

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