solo
Civil

Technical Guide

STORMWATER, INSPECTION PIT, WASTEWATER MANHOLE, STORAGE TANK AND WET WELL SOLUTIONS.

Key features

Lightweight

Customised sizings

Performance

Cost effecient

Standards

AS/NZS 2566.1:1998 Buried flexible pipelines Part 1: Structural design, ensuring structural integrity and compliance with industry standards

AS/NZS 5065:2005 Polyethylene and Polypropylene pipes and fittings for drainage and sewerage applications

0800 765 675

Auckland 33 Honan Place, Avondale
Phone 09 828 9594

Christchurch 72 Hayton Road, Wigram
Phone 03 353 9291

solo.sales@solo.co.nz

solo.co.nz

Solo Plastics Ltd. PE100 Polyethylene (HDPE) Manholes, inspection pits, and storage tanks are tailored to the site-specific, are easy to install and handle.

Introduction

Solo Plastics Ltd. specializes in the design and manufacture of watertight custom High density PE100 Polyethylene (HDPE) Manholes, inspection pits, and storage tanks for the stormwater and wastewater sectors in the civil industry.

NZ Standards

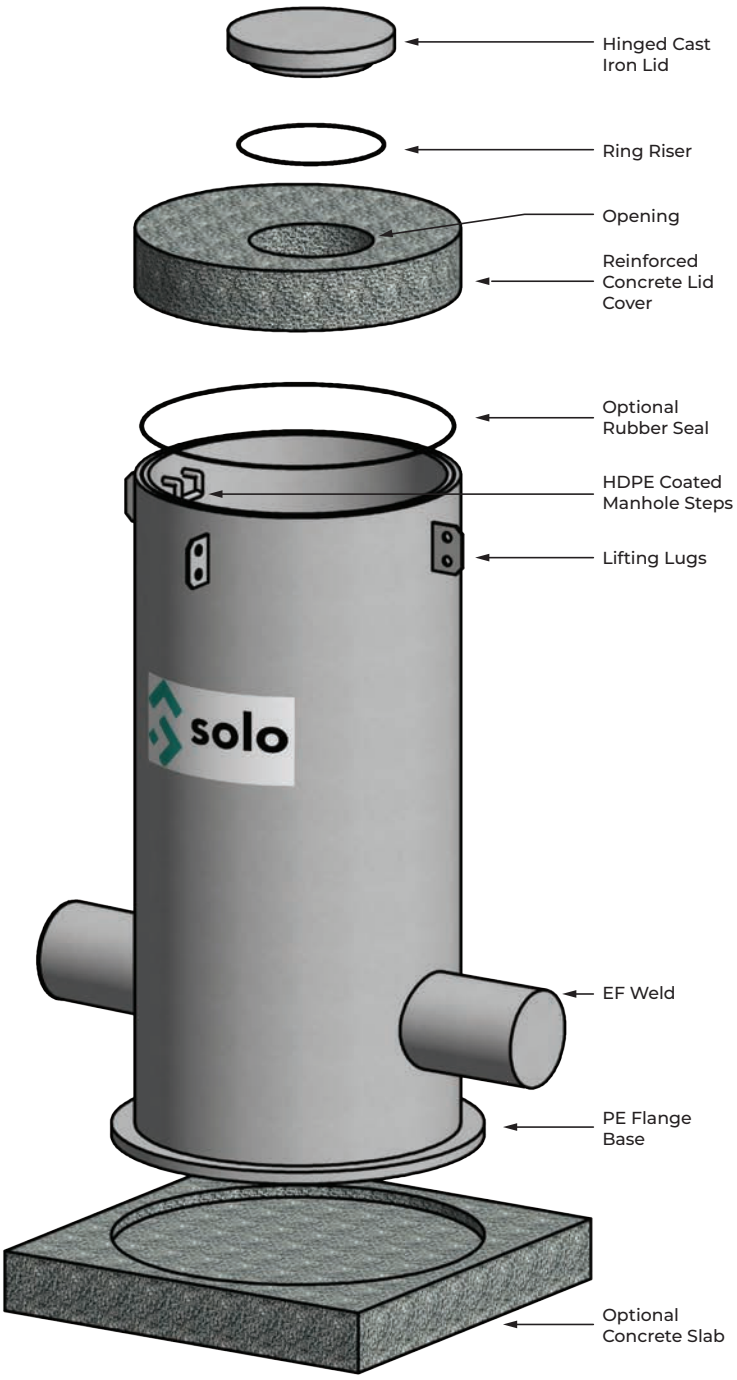
Our products are designed in accordance with "AS/NZS 2566.1:1998 Buried flexible pipelines Part 1: Structural design, ensuring structural integrity and compliance with industry standards". These are fabricated from pipes that are manufactured and certified to meet the requirements specified in "AS/NZS 5065:2005 Polyethylene and Polypropylene pipes and fittings for drainage and sewerage applications". This ensures the quality and reliability of our products, giving our customers peace of mind.

Manufactured Locally

Our products are manufactured locally in New Zealand, with sizes ranging **from 375mm (ID) to 3200mm (ID).** This allows us to cater to a wide range of project requirements and specifications.
Note: Solo have a highly skilled and experienced team to help cater to your specific requirements.

Impressive strength/density ratio

HDPE is a highly versatile thermoplastic polymer and one of the most commonly used materials in manufacturing today. Its molecular structure provides an impressive strength/density ratio and is greatly valued for applications where moisture resistance and cost-effectiveness are desired. HDPE is a long-lasting, thermoplastic solution for creating watertight, leak-proof systems. It has an impressive amount of strength and flexibility, making it highly resistant to corrosion, impacts and pressure.



Our goal is to ensure the life-cycle of HDPE products in New Zealand are extended, instead of them going to waste.

Recycling

HDPE is **100% recyclable** and all products that are used in the manufacture are 100% recyclable as well. Solo believes in a sustainable future, and as such, all waste material created from the manufacture of these manholes is fully recycled.

In addition to this, there are multiple facilities across New Zealand that receive, process and repurpose HDPE. This makes the end of life (cradle to grave) management of HDPE manholes fully sustainable and a sound choice for a sustainable future.

Comparative Analysis of Green House Gases of HDPE vs Concrete

Overall, concrete has a greater Carbon Footprint associated with it, compared to equivalent sized HDPE, in both cradle-to-gate and cradle-to-site scenarios. Studies[1] have found that on average, concrete tends to produce 21% more Green House Gas (GHG) emissions in cradle-to-gate scenarios (kgCO2e per unit length) and 95% more GHG emissions in gate-to-site scenarios (kgCO2e per unit length, per km) respectively, compared to the equivalent HDPE. The results show that HDPE is a significantly more carbon efficient product. As a result, HDPE has the potential to actively aid the construction industry in their formidable task of reducing GHG emissions in accordance with the government's targets.

Green House Gases of HDPE vs Concrete

HDPE

Concrete produces 21% more

Environmental Resistance

HDPE materials have one of the broadest ranges of resistance to corrosive acids and bases, along with salts and seawater environments. Polyethylene does not rust, rot, corrode, or tuberculate like traditional metal or concrete piping and manholes.

HDPE is characterised by:

It's lightweight yet structurally strong formula and is a polymer that is inherently resistant to these issues.

HDPE is a chemically inert material, making it impervious to corrosive compounds. Whereas, over time Hydrogen Sulphide can cause severe damage to concrete structures, leading to costly repairs or complete replacement.

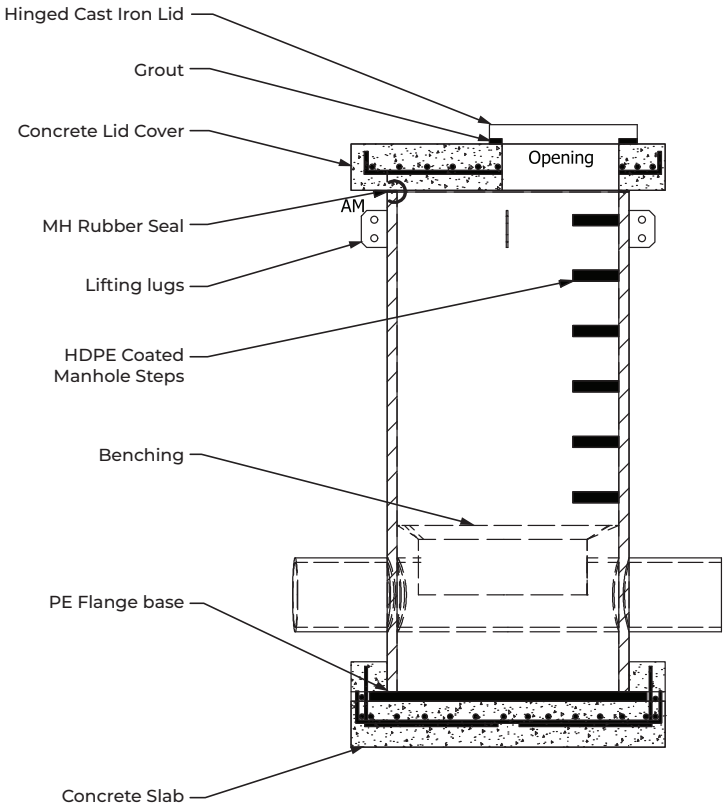
[1] Cowle, Matthew, Vasilios Samaras, and William B. Rauen. "A comparative analysis of the carbon footprint of large diameter concrete and HDPE pipes." Plastic Pipes XVI, Barcelona (2012).

We can fabricate to your designs or can work with your design team to develop the appropriate solution for your needs.

Design

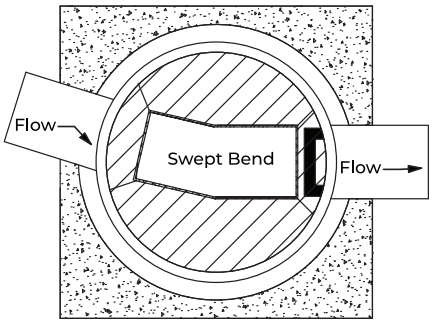
Solo have a highly skilled and experienced team to help cater to your specific requirements. We can fabricate to your designs or can work with your design team to develop the appropriate solution for your needs. In addition, we also have the ability to provide multiple standardised designs to fit most sites.

Solo manholes generally feature a flanged base, which can be laid on an in-situ concrete base or a compacted metal base course. Solo provide detailed information on the required volume of concrete to be poured over the flanged base to meet anti-flotation requirements. This ensures the stability and security of the manhole in its intended location. A trafficable precast concrete lid can be included, which is sealed in place with EPDM rubber strips. For additional security, stainless steel angle brackets can be added.



Inlets and outlets

Inlets, outlets and any required internal benching and access steps are all prefabricated into the manhole structure in our factory prior to delivery to the site. This ensures efficient and streamlined installation processes. To install the manhole, it is simply lowered into place, the concrete is poured over the flanged base (if required), and the connected pipework is either electrofusion (E/F) welded or plugged into the prefabricated rubber ring socket or spigot connections. The manhole should be installed in accordance with the guidelines specified in “AS/NZS 2566.2:2002 Buried flexible pipelines Part 2: Installation”.

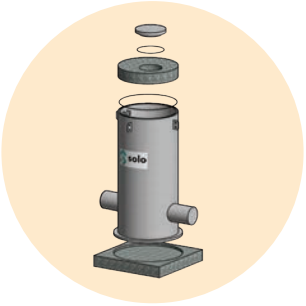


Warrranty

Solo Ltd provide a warranty of 5 years on all fabricated parts. However, you can be confident that this PE product will last for a far longer period than the standard 50 year lifecycle. Multiple scholarly articles point to a service life **in excess of 100 years**. J. Hessel[2] summarized the investigations on used pipes from HDPE and calculated already high residual service life. Due to the extreme material improvements in stress crack resistance, a minimum service life of 100 years is proven for advanced PE100 materials (PE100-RC). Both J.M.B. Sanders[3] and U. Shulte[4] conclude that the service life of a bimodal PE pipe exceeds 100 years based on different applied methods.

Lifetime Cost savings

HDPE manholes offer economic advantages beginning with manufacturing and continuing through the entire service life.
Because HDPE manholes require significantly less energy to manufacture compared to traditional water pipe materials, cost savings follow suit. The lightweight nature of HDPE pipe results in less fuel needed for transport, the need for fewer truck loads, less wear on roadways, and lower transportation costs in general. Add to this the extended life of PE and it is clear that HDPE is the only way to go for the future.



We have the ability to provide multiple standardised designs for your site specific needs."

Standard Sizing **Custom made options avaliable**

Code	Internal Diameter (mm)	Standard* Wall Thickness (mm)	Invert (mm)	Flanged Base**	Suitable Standard precast conc lid size	Est Weight (kg) (excl concrete lid)
MH.1000.30.1500	1000	30	1500	1300mm dia x 30mm thick	Humes 1200 / Hynds 1200	220
MH.1000.40.2500	1000	40	2500	1300mm dia x 30mm thick	Humes 1200 / Hynds 1200	410
MH.1000.40.3500	1000	40	3500	1300mm dia x 40mm thick	Humes 1200 / Hynds 1200	560
MH.1200.40.1500	1200	40	1500	1500mm dia x 30mm thick	Humes 1350 / Hynds 1400	330
MH.1200.40.2500	1200	40	2500	1500mm dia x 30mm thick	Humes 1350 / Hynds 1400	490
MH.1200.45.3500	1200	45	3500	1500mm dia x 50mm thick	Humes 1350 / Hynds 1400	770
MH.1500.55.1500	1500	55	1500	1800mm dia x 40mm thick	Humes 1500 / Hynds 1650	570
MH.1500.55.2500	1500	55	2500	1800mm dia x 50mm thick	Humes 1500 / Hynds 1650	880
MH.1500.60.3500	1500	60	3500	1800mm dia x 60mm thick	Humes 1500 / Hynds 1650	1280

* Wall thickness determined by site specific calculations: eg: traffic loading, watertable level, native soil conditions
** Lay flanged base on metalcourse compacted to 2000kg/m² or cured 20+ MPa concrete, pour in-situ concrete over flange lip for anti-flotation
(add in-situ conc weight to weight of pre-cast concrete MH lid)

[2]Hessel, J., „100-year service-live for polyethylene pipes, Review and prospects" 3R international 46 (2007) Heft 4, Seiten 242-246
[3]J.M.B Sanders, "Degradation of polyolefin pipes" and "Techniques to determine the remaining In-service life of Polymer pipes for the water industry", PhD Thesis, Imperial College London (Dec. 2010)
[4]Schulte, U., "A vision becomes true - 50 years of pipes made from High Density Polyethylene", Plastics Pipes XIII Conference, Washington, 2006

There are significant gains to be made in transportation, installation and storage of HDPE products due to its light weight and durability.

Lighter

It is commonly known that concrete is cumbersome and difficult to manage due to its excessive weight and its inflexibility. When using HDPE, there are significant gains to be made in transportation, installation and storage of HDPE products due to its light weight and durability. When comparing HDPE manholes with concrete manholes, the weight differences are significant.

The density of normal concrete ranges between 2,000 and 2,600 kg/m3[5] whereas HDPE averages around 970 kg/m3[6] . This makes HDPE an average of **62% lighter per m3**. This saves significantly on heavy haulage as well as the size of machinery required for installation on site. Added to this, the lightweight nature of HDPE means that longer lengths of pipe can be transported thus further reducing transportation costs as well as installation time. The durability and flexibility of HDPE makes the manholes more resilient – no more cracked sockets!

Quicker to Install

Installation of Concrete can take a 3 to 4 person team two full days – namely one day to install and one day to connect and bench. HDPE is much quicker and easier to install with a 2 to 3 person team fully installing the unit within one day.

Completely Sealed Unit

HDPE manholes are complete sealed units, meticulously engineered to prevent any seepage of groundwater, safeguarding the integrity of underground utilities and infrastructure.

[5]Normal Concrete, Cemex, 30, Oct 2023, https://www.cemex.co.uk/how-much-does-a-m3-of-concrete-weigh, (2023)
[6]Properties of polyolefins, HDPE, Plastics Europe, 31 Oct 2023, https://plasticseurope.org/plastics-explained/a-large-family/polyolefins/#:~:text=The%20density%20of%20HDPE%20can,cm3%20or%20970%20kg%2Fm3, (2023)

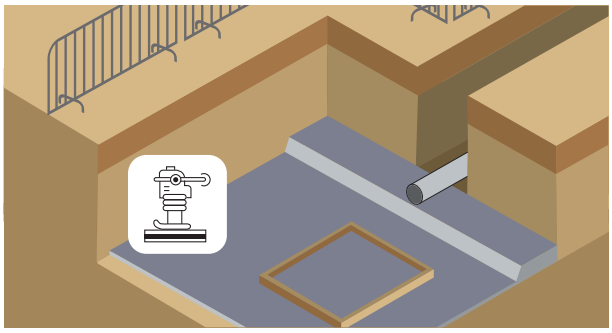
Installation Guidelines for Watertight Manholes and Inspection Pits in accordance with NZ Standards

Note: It is essential to consult and adhere to the specific guidelines and requirements outlined in the AS/NZS standards mentioned (AS/NZS 2566.1:1998, AS/NZS 5065:2005, AS/NZS 2566.2:2002) throughout the installation process to ensure compliance and the proper functioning of the manholes and inspection pits.

1. Base Preparation:

a) If an in-situ concrete base is specified, construct the base by following the guidelines outlined in **"AS/NZS 2566.2:2002 Buried flexible pipelines Part 2: Installation".**

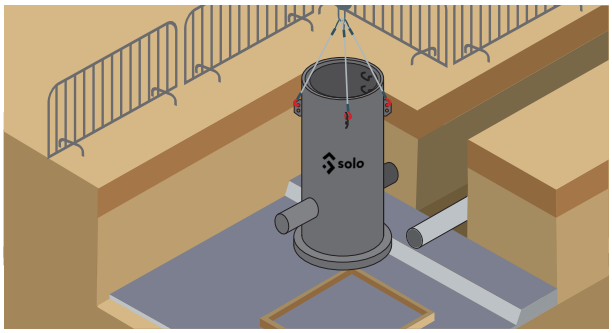
b) If a compacted metal base course is specified, ensure that the base is properly levelled, compacted, and capable of providing a stable foundation.



2. Positioning and Alignment:

a) Lower the manhole or inspection pit into the prepared excavation, ensuring proper alignment and orientation as specified in the design.

b) Use appropriate lifting equipment to safely position and lower the structure, taking care not to damage any components or fittings.

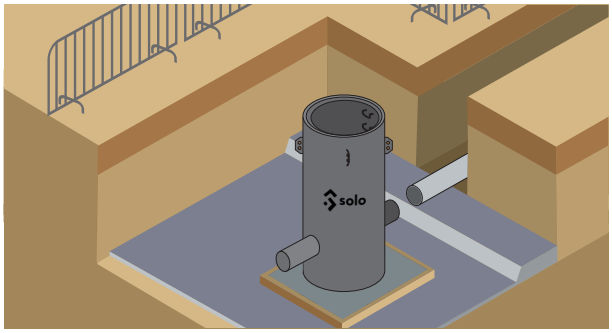


3. Concrete Encasement:

a) Determine the required volume of concrete needed to encase the flanged base of the manhole or inspection pit, as specified in the design and anti-flotation requirements.

b) Pour the concrete evenly over the flanged base, ensuring complete coverage and proper consolidation.

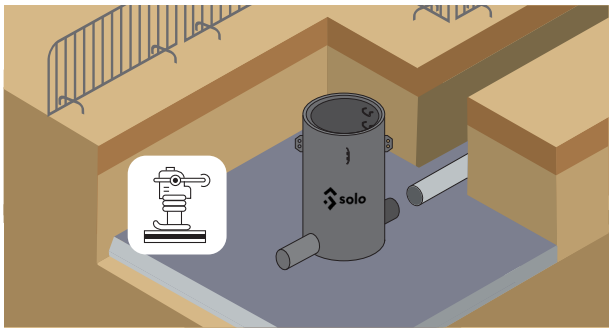
c) Smooth and level the concrete surface to create a uniform and trafficable base for the structure.



4. Backfilling and Compaction:

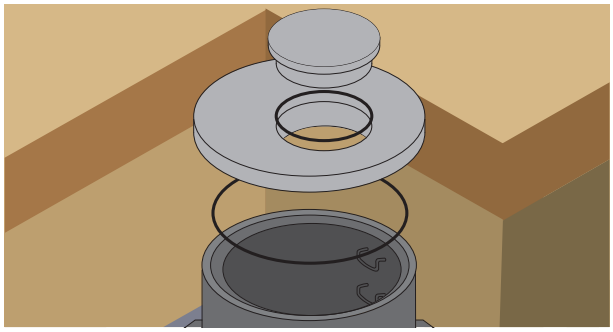
a) Backfill the space around the manhole or inspection pit with suitable material, following the guidelines in **"AS/NZS 2566.2:2002"**.

b) Compact the backfill material in layers to achieve adequate compaction and prevent future settlement or instability.



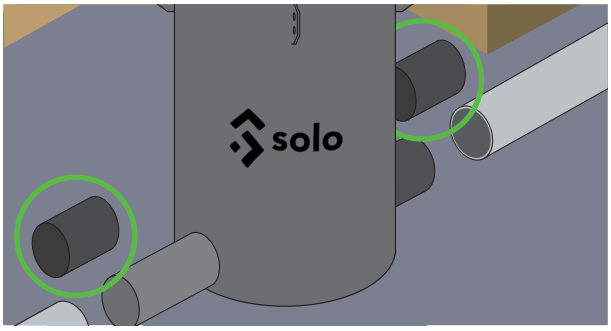
5. Lid Installation:

a) Install the Solo EPDM rubber strip or other approved sealing material to create a watertight seal between the lid and the structure.
b) Place the trafficable precast concrete lid onto the manhole or inspection pit, ensuring a proper fit and alignment.
c) If additional security is required, attach stainless steel angle brackets to reinforce the lid and prevent unauthorized access.



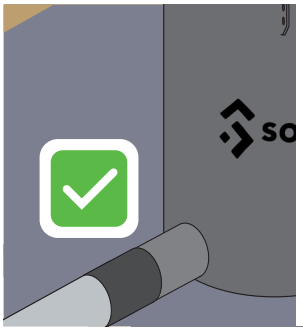
6. Connection of Pipework:

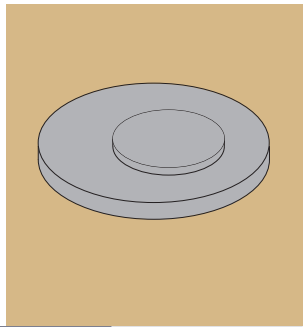
a) Connect the inlet and outlet pipes with an E/F coupler or a prefabricated socket and rubber ring spigot connections provided on the manhole or inspection pit structure.
b) Ensure that the connections are properly sealed to prevent leakage or infiltration.



7. Final Inspection:

a) Conduct a thorough inspection of the installed manhole or inspection pit to ensure compliance with the design, standards, and specifications.
b) Verify that all components, fittings, and connections are secure, properly aligned, and in good working condition.
c) Address any identified issues or deficiencies before finalizing the installation.





Solo Plastics

0800 765 675

Auckland 33 Honan Place, Avondale
Phone 09 828 9594

Christchurch 72 Hayton Road, Wigram
Phone 03 353 9291

solo.sales@solo.co.nz

solo
Fabricating for a better tomorrow
He waka eke noa

Telarc. Registered — Quality ISO 9001
Telarc. Registered — Environment ISO 14001
Telarc. Registered — Health & Safety ISO 45001

SITEWISE 100% 2023/24

NZGBC TE KAUNIHERA HANGANGA TAUTAIAO
Member 2023–2024

solo.co.nz