Water Supply and Sewerage Approved Products Manual 2022

Sewerage Gravity Other Products – Maintenance Structures

Section SGOP 01



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1 Access chamber covers and frames

1.1 Rectangular gastight or watertight recessed cover - 900 mm x600 mm



Notes: Access covers and frame comprises of a cover of ductile cast iron grade 500-7¹ or 600-3² (dependant on product) to AS 1831 and frame of grey cast iron grade T220 to AS 1830.

Other products (like composite covers and frames) may be considered for installation. Specific approval is required from Power and Water.



2 Access chamber segments

2.1 Shaft segments

Diameter (mm)	Height (mm)	Products	Manufacturers
1,100	150		Durham
	260		Humes
	300		
	565		
	600		
	885		
	900		
	1,200		
	1,510		
	1,825		
	2,135		

2.2 Bases



2.3 Cover slabs

Cover/Frame	Products	Manufacturers
Rectangular		Durham
		Humes
Circular		





Notes: Gastight sealed for sewerage and watertight sealed for non-sewerage

2.4 Jointing and repair



3 Maintenance shafts

Compliance	Products	Manufacturers
WSA PS 322 AS/NZS 4798 WSA PS 321 WSA 137-2018		Aymroo
	For each of the second se	Iplex EZIPit
		Rehau AWASHAFT 400

Notes: Constructed to manufacturers specification. Parts provided by manufacturer.



4 Inspection openings

4.1 Inspection openings cover and frames

IO type	Products	Manufacturers
Light duty	1	Durham
		Humes
		Gatic
Heavy duty		

4.2 Inspection opening concrete surround

IO type	Products	Manufacturers
Light duty		Durham Humes
Heavy duty		



5 Specifications

5.1 SGOP 01 - 1 Precast Concrete Maintenance Holes

Standard:

- AS 4198:1994 Precast concrete access chambers for sewerage applications
- AS 3735:2001 Concrete structures for retaining liquids
- WSA PS 323 Maintenance Holes (MH) Pre-Cast Concrete for Non-Pressure Applications Sewerage.

Design:

- Concrete constituents and reinforcement cover have been chosen to provide improved performance. Maintenance holes within the Northern Territory are:
 - Mostly exposed internally to stale sewage due to high ambient temperatures and under alternate wet and dry (condensation, splashing or washing) conditions this equates to exposure classification D in Table 4.1 of AS 3735. This condition is exacerbated by high sulphate levels present in water supplies sourcing ground water.
 - Exposed externally under worst case conditions to ground water in sandy soils, which may be saline with resistivity < 10Ω .m or having sulphates > 6000 ppm; this equates to exposure classification C to Table 4.1 of AS 3735 supplement 1.
- Concrete cover to reinforcement is derived from Table 4.3 of AS 3735. The cover decreases with increased concrete strength so the highest strength concrete is to be adopted to minimise cover. Reinforcing in shaft segments is to be circular, not elliptical.
- All components to be designed to withstand an ultimate load test of 210 kN.

Materials:

- Concrete Concrete to AS 1379/AS 3735 with compressive strength (f'c) of 50 MPa min at 28 days, nominal slump 80 mm, cement content of 400 kg/m3 min. Water absorption of 6.5% maximum to AS 4198. Water/cement ratio not to exceed 0.5 and maximum drying shrinkage at 56 days of 700 x 10-6.
- **Cement** Generally Type GP cement to AS 3972 or where specified Type SR cement to AS 3972.
- Aggregate Aggregate to AS 2758.1, durability for exposure classification C and maximum water absorption of 2.5%. Coarse aggregate with maximum particle size of 20 mm.
- Reinforcement Welded wire fabric, wire and bars to AS/NZS 4671.
- **Reo-supports** Stainless steel grade to ASTM A 276 grade 304, or plastic.
- Joint seal Approved epoxy.
- **Coatings** Approved high build solventless epoxy (2 coats min.) where specified.



Internal surface:

- **Appearance** To class 2X finish shown in photograph in Appendix B of AS 3610 with blowhole depth not to exceed 5 mm.
- Smoothness Hand finish as necessary to remove abrasive roughness. Do not bag.

Segment joints:

• Flush jointed with epoxy mortar jointing.

Reo cover:

- Internally: 45 mm (min)
- Externally: 45 mm (min).

Internal diameter:

• Shaft Segments: 1100 mm nominal minimum.

Markings:

- Manufacturer's name or registered trademark, or both
- For unreinforced components, 'U'
- For reinforced components, 'R'
- Date and place of manufacture, or the manufacturer's traceability code incorporating date
- Maximum mass of component in kilograms
- The Australian Standard number, i.e. AS 4198 (if product certification obtained)
- Product certification mark (if product certification obtained) e.g. StandardsMark
- For components using Type SR cement, 'SR'.

Markings method:

- Clearly marked in an easily visible location.
- Marking of cover slab to be on the top surface.
- Major top components to have permanent and indelible marking on the inside surface.
- Other components need not have permanent marking.



5.2 SGOP 01 - 2 Maintenance Shaft Access Covers and Frames

Standard:

AS 3996:2019 - Metal access covers, road grates and frames
WSA PS -291 - Ductile Iron Access Covers and Frames for Drinking Water, Non-Drinking
Water Supply and Sewerage to EN 124-2.

Design:

- Unit (cover and frame) are to withstand loads applicable for the location of use as defined by the class.
- Mating surfaces of cover and frame are to be machined to provide:
 - Even and secure seating of cover in frame
 - Permanent elimination of movement or dislodgment by normal traffic
 - Watertight or gastight seal as required when coated with 0.25 mm grease or equivalent.
- Cover to include lifting holes with preferred dimensions as given in AS 3996 figure 3.1 and clockwise key engagement.
- Lifting keyholes to be fitted with removable plastic plugs to prevent material ingress.
- Recessed or infill type covers to have cross webbed, cellular construction not less than 15 mm deep to allow for concrete infill extending to within 25 mm of the outside of the frame at surface level but excepting keyhole housings and manufacturer's name or identification mark.
- Clearance between cover and frame and between covers in multiple cover units not to exceed 3 mm as measured at the cover surface.
- Concrete not to be proud of the metal top of the unit by more than 1 mm.
- Clearance between a straight edge and the top of a unit not to exceed 3 mm at any position that the straight edge is laid.
- Covers to be interchangeable in any frame from that manufacturer.

Materials:

- **Cover** Ductile cast iron grade AS 1831/500-7 or 600-3
- Frame Grey cast iron grade AS 1830/T220
- **Concrete for frame slab** Concrete to AS 1379 with minimum compressive strength of 32 MPa at 28 days and minimum cement content of 400 kg/m³
- **Cover bolts** Stainless steel to ASTM A276 grade 304 or 316
- **Coating** Bitumen to BS 3416 type II where cold applied and to BS 4147 type I grade C where hot applied



Allowed classes and finish:

- **Class D** Road reserves including the verge, nature strip or footpath and walkways or malls. Surface of cover to be flush with surrounding finished surface level
- **Class B** Other areas than specified for class D. Surface of cover 150 mm minimum above the surrounding finished surface level
- Class C Non-urban areas where specified.

Allowed shapes:

• Rectangular (900 mm x 600 mm clear opening) - Class B, C and D.

Allowed types:

- Sewerage Gastight sealed recessed or solid top
- Non-sewerage (valve pits etc.) Watertight sealed recessed or solid top.

Markings:

- Manufacturer's name or registered trademark
- Year of manufacture
- Code indicating place of manufacture
- Register or marking to show orientation of cover in frame (if specific orientation is essential)
- Class and type of unit, e.g. Class D, Watertight sealed
- Approximate maximum mass of the unit (cover & frame) including concrete, visible from above
- The Australian Standard number, i.e. AS 3996
- Product certification mark, e.g. StandardsMark.



5.3 SGOP 01 - 3 Plastic Maintenance Shafts

Standards:

- AS/NZS 4999:2016 PVC-U Maintenance Shafts
- WSA PS 321 Maintenance Shafts (MS) Polyvinylchloride, Unplasticised (PVC-U) for Non-Pressure Applications – Gravity Sewerage
- WSA 137:2018 Industry standard for maintenance shafts, maintenance chambers and maintenance holes for sewerage.

Design:

- Plastic maintenance shafts are to comprise a base chamber and a pipe riser.
- The riser may include junction fittings for property connections.
- The riser is to be adjustable to within 0.5° of vertical using fine angle bends (1 to 5°) at the chamber/riser connection.
- Plastic maintenance shafts are to be of a design to permit unimpeded access of maintenance equipment (i.e. jetters, cutters, sealing plugs, cameras, etc.) into the pipeline and allow unhindered operation of equipment from the surface.
- Internal surfaces of joints are to be smooth. The base chamber is to be of appropriate stiffness, shape and design to resist:
 - External hydrostatic pressures up to 6 m pressure head to invert without buckling
 - Soil loads up to 6 m depth to invert without cracking or significant deformation (negative or inward side deflection and inward curvature at any point is not allowed)
 - Flotation.

Materials:

- Base chamber:
 - PVC pipe sections to AS/NZS 1260 with polyester resin impregnated glass fibre reinforcement of fabricated joints.
 - Polyethylene to AS/NZS 4131, Type 80B or 100 or other approved compound with fusion jointing of segments to approved procedure. Polypropylene to AS/NZS 5065 or ISO 8773.
- **Riser components** PVC pipes and fittings to AS/NZS 1260 with polyester resin impregnated glass fibre reinforcement of fabricated joints, pipe stiffness class SN8
- Sewer joint seal Approved elastomer to AS 1646.
- **Riser joint seal** Solvent cement to AS/NZS 3879 (Junction fitting on the riser may alternatively use an elastomeric seal to AS 1646).

Dimensions:

- Riser DN 225
- Chamber Structural design dependent.



Connections:

- VC pipeline systems to EN 295 and AS 1741
- Plain wall and ribbed PVC pipeline systems to AS/NZS 1260.

Component markings:

- Manufacturer's name or registered trademark, or both
- Component description, e.g. 150 x 150 x 15° MSEL (chamber with 150mm diameter end connections and a 15 degree elbow)
- Material designation, e.g. 'PVC' or 'PE'
- Date of manufacture in the form 980721 (year, month, day)
- Identification of the place of manufacture
- Direction of flow (chamber marking only).

Marking method:

• Durably marked.

Use limits:

- DN 150 and DN225 maintenance shafts are approved
- Do not use maintenance shafts where depth to invert exceeds 3m, unless specific project approval has been granted by the Water Engineering section of Power and Water
- Only use maintenance shafts adjacent to access chambers
- Do not connect branch sewers at maintenance shafts
- Do not use a maintenance shaft as the first access upstream of an in-line gas trap
- Do not use maintenance shafts at discharge points of pumping mains
- Do not connect property connections to the chamber
- Do not connect more than two property connections to the riser and connect only residences.



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