Assets Planning and Delivery Group
Engineering

Strategic Product Specification

SPS 700
Precast RC Access Chambers

VERSION 1
REVISION 2

JUNE 2024

FOREWORD

Each Strategic Product Specification has been prepared to inform Water Corporation staff, consultants, contractors and land developers of the requirements for selecting and acquiring a manufactured product to be used in strategic Corporation infrastructure. The definition of 'Product' includes items that comprise assembled components, equipment or plant for mechanical, electrical and civil infrastructure applications.

The objective of a Strategic Product Specification is to specify fit-for-purpose Product which will contribute to the provision of effective water services at least whole-of-life cost and with least risk to service standards and safety. A Strategic Product Specification also provides uniform standards for compatibility of new water infrastructure with existing water assets.

Many Strategic Product Specifications have drawn on the design, asset management and operational experience of Product performance in live service gained by the Corporation over time. Some Strategic Product Specifications have drawn on the experience of the water industry nationally by referencing Australian or WSAA standards.

Strategic Product Specifications are intended for reference and use in the following typical procurement scenarios:

Capital funded infrastructure design and construction work;
Private developer funded subdivision infrastructure for takeover by the Corporation;
Operationally funded infrastructure design and construction work;
Corporation period contracts for Product purchases;
Product purchases for stock or for miscellaneous minor work.

A published Strategic Product Specification will, in some cases, comprise technical content that is typical of a range of products of the same type (type specification) but may exclude specific requirements that should apply to a particular project or application. In such cases, the project designer is required to document the supplementary project specific requirements in the 'Project Specific Requirements' Appendix of the Specification.

The text of a published Specification should not be directly modified. In the event that a text variation is considered necessary to accommodate the needs of a particular project or application, the text modification should be documented in the appropriate Clause of a 'Project Specific Requirements' Appendix.

Enquiries relating to the technical content of this Specification should be directed to the Senior Principal Engineer, Wastewater Conveyance, Engineering.

Head of Engineering

This document is prepared without the assumption of a duty of care by the Water Corporation. The document is not intended to be nor should it be relied on as a substitute for professional engineering design expertise or any other professional advice.

Users should use and reference the current version of this document.

REVISION STATUS

The revision status of this specification is shown section by section below:

REVISION STATUS						
SECT	**VER/ REV**	**DATE**	**PAGES REVISED**	**REVISION DESCRIPTION (Section, Clause, Sub-Clause)**	**RVWD**	**APRV**
1	1/0	30.5.2018	All	New Document	KR	KP
All	1/1	3.08.2023	N/A	Scheduled review, no change required	KP	KP
All	**1/2**	**14.06.2024**		Multiple "compliance" references changed to "conformity" & TOC updated	**KR**	**KP**
2	1/0	30.5.2018	All	New Document	KR	KP
3	1/0	30.5.2018	All	New Document	KR	KP
3	**1/2**	**14.06.2024**	Cl 3.2/3.6	Design basis and references changed from AS 3735 to AS 4198	**KR**	**KP**
4	1/0	30.5.2018	All	New Document	KR	KP
5	1/0	30.5.2018	All	New Document	KR	KP
6	1/0	30.5.2018	All	New Document	KR	KP
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8	**1/2**	**14.06.2024**	Appendix B	ITP updated to reflect AS 4198:2022 clause references and overall design basis	**KR**	**KP**
9	1/0	30.5.2018	All	New Document	KR/IP	KP
9	**1/2**	**14.06.2024**	**Appendix C**	**MMR table reviewed**	**IP**	**KP**

Strategic Product Specification
SPS 700
Precast RC Access Chambers

CONTENTS

1 Scope and General

1.1 Scope

This Specification sets out requirements for the design, manufacture, production testing, handling and delivery of circular precast reinforced concrete access chambers and, where agreed, selected valve pits and small pumping stations intended for installation in developed land across Western Australia. The specification aligns with AS 4198 and is intended for below ground non-pressure conveyance applications. The specification also details the means by which conformity with specified requirements shall be demonstrated together with the criteria for Product acceptance.

Wastewater conveyance sewers are generally DN 900 or less in size and the economics of catchment conveyance generally requires a depth to pipe invert that is 6m or less. New main drainage conveyance pipelines are generally DN 1800 or less in size and their depths are generally determined by the configuration of existing main drainage system catchments and outfalls subject to drainage project economics and local authority requirements.

NOTE: Access chamber shaft and base components conforming with SPS 700 may, by agreement, be adapted for use in conveyance facilities other than DS 50 conforming wastewater access chambers. This includes their adaptation for use in DS 51 conforming wastewater air valve, scour valve and flowmeter pits, in smaller (Type 6 and 10) DS 51/SPS 702 wastewater pumping stations and in DS 60 water conveyance valve pits.

1.2 Referenced Documents

The following documents are referenced in this Specification:

Water Corporation

DS 50	Design and construction requirements for gravity sewers DN 150 to DN 600
DS 51	The Design and Construction of Wastewater Pumping Stations and Pressure Mains 4.5 to 180 Litres Per Second Capacity
DS 66	Urban Main Drainage Standard
DS 95	Standard for the selection, preparation, application, inspection and testing of protective coatings on Water Corporation assets
S151	Prevention of Falls
	Strategic Products Register
SPS 801	Access Covers for General Purposes
SPS 802	Assisted-Lift Access Covers

WSAA

WSA 132	Industry standard for ductile iron access covers for water supply and sewerage
WSA 133	Industry standard for lightweight macro-composite access covers and compatible frames for water supply and sewerage

AS

1199	Sampling procedures for inspection by attributes - Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
1379	Specification and supply of concrete
1646	Elastomeric seals for waterworks purposes (Performance requirements in AS 681)
681.1	Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications - Vulcanized rubber
681.2	Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications - Thermoplastic elastomers
1726	Geotechnical site investigations
2550.1	Cranes, hoists and winches – Safe use – General requirements
2550.3	Cranes, hoists and winches – Safe use – Bridge, gantry, portal (including container cranes), jib and monorail cranes
2550.5	Cranes, hoists and winches – Safe use – Mobile
2550.11	Cranes, hoists and winches – Safe use – Vehicle loading

2758.1	Aggregates and rock for engineering purposes-Concrete aggregates
3600	Concrete Structures
3996	Access covers and grates
4198	Precast concrete access and maintenance chambers for sewerage applications
4671	Steel reinforcing bars for concrete
5100.2	Bridge Design – Design Loads
EN	
124	Gully tops and manhole tops for vehicular and pedestrian areas – Design requirements, type testing, marking, quality control
AS/NZS	
1170.0	Structural design actions - Part 0: General principles
1170.0 Supp. 1	Structural design actions - Part 0: General principles - Commentary
1170.1	Structural design actions - Part 1: Permanent, imposed and other actions
3725	Design for installation of buried concrete pipes
4058	Precast concrete pipes (pressure and non-pressure)
4671	Steel reinforcing materials
4680	Hot-dipped galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS ISO IEC	
9001	**AS/NZS ISO 9001**: Quality management systems – Requirements
17000	**ISO/IEC 17000**: Conformity assessment – Vocabulary and general principles
17025	**ISO/IEC 17025**: General requirements for the competence of testing and calibration laboratories
17026	**ISO/IEC 17026 (TR)**: Conformity assessment – Example of a certification scheme for tangible products
17067	**AS/NZS ISO/IEC 17067**: Conformity assessment – Fundamentals of product certification and guidelines for product certification schemes

1.3 Definitions and Notation

The following definitions are intended to clarify the terminology used in this Specification.

1.3.1 Australian Standards®

Standards that are developed, published and maintained by Standards Australia

1.3.2 Certificate

A formal certificate issued by a Conformity Assessment Body as an outcome of a compliance audit in accordance with a Certification System.

1.3.3 Certification Mark

A proprietary mark of product conformity issued in accordance with ISO/IEC 17030.

1.3.4 Certification System

An impartial third party product certification scheme or combination of schemes, as exemplified in ISO/IEC TR 17026, that are in accordance with the fundamentals of AS/NZS ISO/IEC 17067 and with the guiding principles of ISO/IEC Guide 28.

NOTE: The effect of this is to require maintenance by the manufacturer of effective production control planning in addition to full type testing from independently sampled production and subsequent verification of conformity with specified standards.

1.3.5 Conforming Product

Product that demonstrably conforms with standards and specifications nominated by the Corporation, where assessed by means of Product Appraisal.

1.3.6 Conformity Assessment Body (CAB)

A third party organisation that has been duly accredited as meeting the requirements of AS/ANZ ISO/IEC 17065 by a signatory member of the International Accreditation Forum (IAF) Multilateral Arrangement (MLA), previously known as a **Certification Body**.

1.3.7 Corporation

The Water Corporation of Western Australia.

1.3.8 Manufacturer

An entity or combination of entities that are responsible for selection, processing and control of Product constituent materials or compounds and for the processing equipment that collectively result in the manufactured product.

1.3.9 Notation

Statements governed by use of the word 'shall' are mandatory or 'normative' requirements of the Specification. Statements expressed by use of the words 'should' or 'may' are 'informative' but not mandatory and are provided for information and guidance. Notes in Specification text are informative. Notes that form part of Specification Tables are normative. An Appendix to the Specification that is designated 'normative' contains mandatory requirements. An Appendix that is designated 'informative' is provided for information and guidance only. The term 'specified' includes requirements of the Specification and requirements stated or referenced in other project documentation.

1.3.10 Officer

A duly authorised representative or appointed agent of the Corporation.

1.3.11 Product

A single unit or multiple units of manufactured end product or an assembly of manufactured component products, materials or equipment. This Specification and accompanying Purchasing Schedule define the nature and details of Product to be supplied.

NOTE 1: An end product is most commonly an output of manufacturing processes that result in finished end products having the same features and characteristics and can be the result of a single or multiple production batches.

NOTE 2: Manufactured equipment and assemblies of Product components or materials are commonly procured for mechanical, electrical and civil infrastructure applications.

1.3.12 Product Appraisal

A formal process whereby Product is subjected to systematic engineering assessment to determine its fitness for prescribed end uses and to evaluate its conformity with specified standards and requirements. Product Appraisal includes verification of the extent of conformity in accordance with the requirements of a relevant 'Technical Compliance Schedule'.

1.3.13 Product Assessor

An organization, Officer or other person who, having demonstrated specialist product knowledge and competence acceptable to the Corporation, is appointed to evaluate Product, appraises the Product and issues one or more Product Verification Reports.

1.3.14 Product Certification

A formal process whereby the production and management systems for the manufacture of Product, are assessed by a Conformity Assessment Body to evaluate conformity of these systems with specified product standards and tests, in accordance with Certification Scheme rules.

1.3.15 Product Verification Report

A formal report wherein a Product Assessor evaluates the extent of Product conformity with the specified product standards and specifications.

NOTE: Verification may be on a project-by-project basis or at agreed intervals, as appropriate to the scope of a Purchasing Schedule and Product end use, subject to determination by the Corporation.

1.3.16 Product Warranty

A formal express undertaking by a Supplier that indemnifies the Corporation against the consequences of supplied Product failure to conform with specified fitness for application and in-service life expectancy performance requirements.

1.3.17 Purchasing Schedule

A Corporation purchase order, tender, schedule of prices, bill of quantities, or specification that details the nature, quantity and other characteristics of Product to be supplied, purchased or installed.

1.3.18 Quality System

A management system that establishes, documents, implements and maintains organizational structures, resources, responsibilities, processes and procedures for the manufacture of Product and provision of Product related services in accordance with the requirements of AS/NZS ISO 9001.

1.3.19 Standards Australia

The peak non-government standards development body in Australia which develops and publishes Australian Standards®.

1.3.20 Strategic Product

An essential infrastructure component whose performance is critical to the elimination of risk to the safe and effective provision of water services, which are functions of the Corporation under the Water Corporation Act as licensed under the Water Services Coordination Act.

NOTE: Strategic product is a component of permanent Corporation infrastructure. Ancillary operational and safety equipment that does not form part of permanent infrastructure but offers exceptional enhancements in operational performance or personnel safety may also be deemed strategic.

1.3.21 Strategic Product Appraisal Process

The process described in Section 3 of the Strategic Products Register whereby manufactured products and equipment are evaluated and authorised for use in Corporation infrastructure, subject to demonstrated conformity with the nominated product performance requirements.

1.3.22 Supplier

An entity or combination of entities that is responsible for the supply of Product.

NOTE: A Supplier may be a Manufacturer, owner, producer, distributor, vendor, agent, tenderer or contractor for supply of Product or Product related service.

1.3.23 Testing

The determination of Product characteristics by inspection and by the application of specified test procedures in order to determine Product conformity with nominated performance requirements.

2 Access Chamber Configuration

For the purposes of this Specification, typical access chambers shall be configured to provide nominal internal access shaft diameters of 1050 mm, 1200 mm, 1500 mm 1800 mm and 2100 mm. Access chamber shaft diameter shall be selected in accordance with DS 50 and project requirements as specified in project documents.

Access chamber assembly components shall be defined as illustrated in Figure 2.1 **Typical Access Chamber Assembly** and as described in AS 4198, supplemented by the descriptions below:

2.1 Access Chamber

A below ground chamber which is intended to provide safe access to persons and equipment for the purposes of inspection, testing, removal of obstructions, repair, maintenance and replacement work associated with the chamber and connected pipelines.

NOTE: Access chambers were once known as manholes (MH). They are also referred to in parts of Australia as maintenance holes (MH) or maintenance structures but should not be confused with maintenance shafts that are, typically, smaller, made from plastics materials and are not designed for safe person entry.

2.2 Access Cover

A removable single part circular or rectangular cover/lid or multi-part system of single-part (usually rectangular or square) cover/lid components that covers an access chamber opening for the purposes of person and equipment entry into and out of the chamber below the opening.

2.3 Access Clear Opening (CO)

The dimensions of the unobstructed access chamber opening (with access cover removed) as defined in AS 3996.

2.4 Conversion Slab

An upper access chamber component, typically made of precast reinforced concrete, that transitions from the internal dimensions in the horizontal plane of the primary (or lower) access chamber shaft to dimensions approximating those of the chamber entry opening.

2.5 Frame

A manhole top frame as defined in EN 124.1 that is the fixed part of an access opening cover and frame assembly/unit. It aligns with the “frame” definition in AS 3996 for cover/frame assemblies and facilitates the receipt, location and provision of support all round for the mating access cover/lid.

2.6 Make-up Brickwork

A number of cement mortar jointed courses of structural brickwork built above a conversion slab to provide unobstructed access between access cover and conversion slab openings. Make-up brickwork is required to safely support access cover and surround assemblies and superimposed loads. It is also required to match finished surface or pavement disposition and levels and enable cost effective adjustment to accommodate finished (e.g. road) surface modifications.

2.7 Shaft Section/Liner

One of a number of standard depth access chamber sections which, together with other shaft sections/liners and a make-up shaft section/liner where specified, forms the primary (lower) access chamber structure between the precast base and the conversion slab. Shaft sections/liners are also known as ‘segments’ and are manufactured in a number of standard ‘full depth’ and shorter ‘make-up depth’ options to facilitate lower chamber assembly adjustment to match project installation depth and conversion slab level.

NOTE: Where agreed, a shaft section/liner component may be formed by a reinforced concrete pipe of the same nominal diameter in accordance with AS/NZS 4058, provided that pipe and mating pipe joints with other pipe/non-pipe sections/liners demonstrably conform with concrete cover to reinforcement, water absorption, hydrostatic pressure and joint assembly test requirements as shown in Section 9/Appendix B.

2.8 Spacer

One of a number of shallow precast concrete rings or squares (also known as risers) that facilitate adjustment of the upper chamber structure to match various installation depths and finished surface or pavement levels. Spacers may be used as an alternative to structural make-up brickwork to provide unobstructed access between access cover and conversion slab openings.

2.9 Precast Base

A pre-formed pre-cast access chamber foundation component that comprises a structurally monolithic shaft and base section which is commonly pre-cored to facilitate inlet and outlet pipeline connections in various configurations.

2.10 Surround

A precast structural RC surround into which an access cover and frame assembly is cast for the purposes of safely transferring self-weight and imposed loads to the structure below and to the surrounding backfill and soil material.

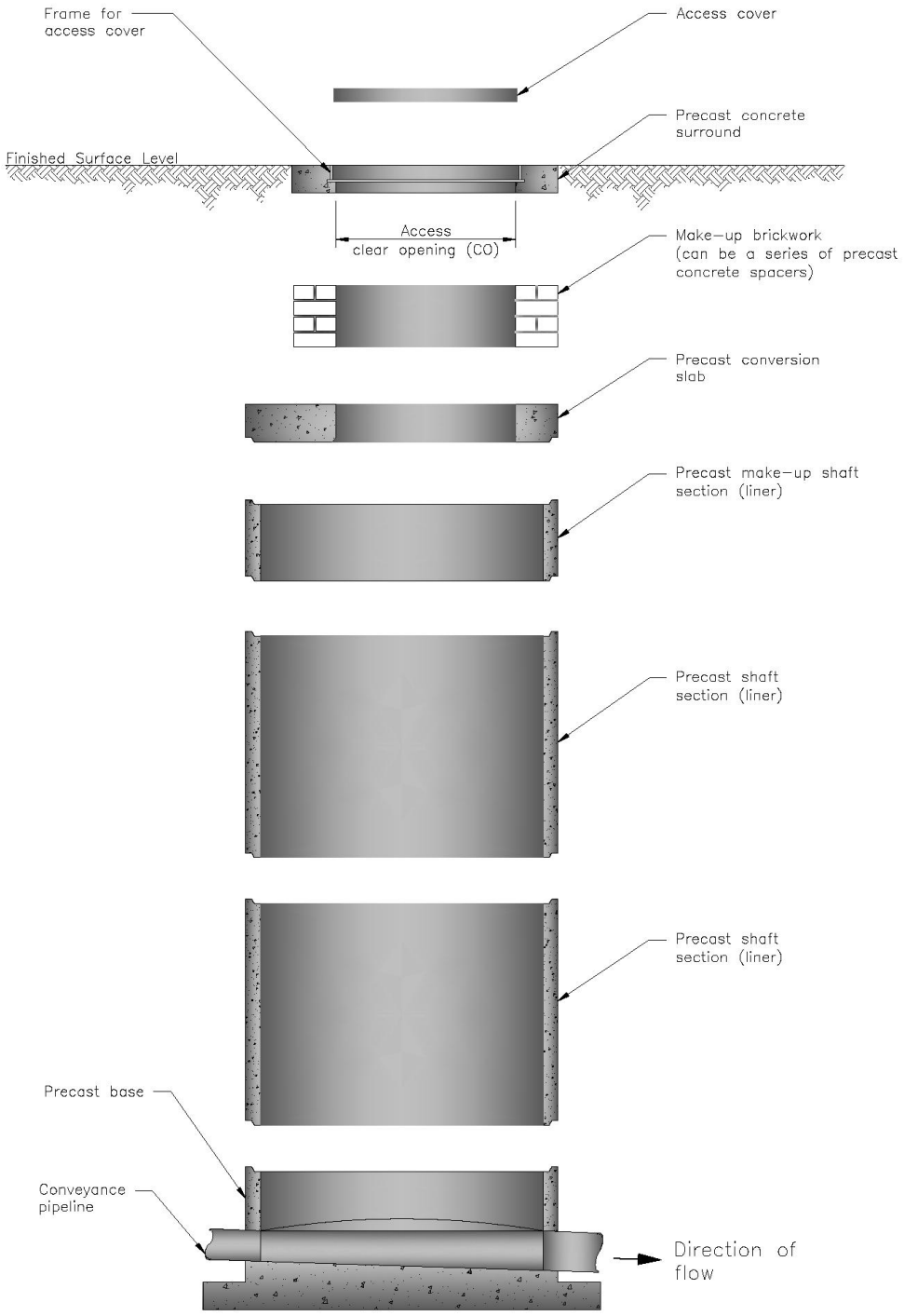

FIGURE 2.1:
TYPICAL ACCESS CHAMBER ASSEMBLY

REFER WATER CORP. STD DRAWING BB38–90–1 FOR ACCESS TO CAD FILES

3 Performance Requirements

3.1 General

Pre-cast access chamber components shall be designed in accordance with the performance requirements herein including conformity with the nominated requirements of AS 4198, AS/NZS 4058 and AS/NZS 1170 as specified herein. Verification of conformity with requirements shall be in accordance with Section 6 of this Specification including an acceptable inspection and test plan as described therein.

There shall be no provision for fixed access step irons or ladders in pre-cast concrete access chamber components.

3.2 Configuration and Dimensions

Typical access chamber (AC) configurations and common installation applications are tabulated in Table below together with usage limitations, relative to the aggressiveness of the prevailing internal wastewater flows conditions and the external buried environment.

TABLE 3 - ACCESS CHAMBER TYPES

Type	Configuration and Materials	Typical Application
1	Precast Concrete Segments	AC on DN 150 to 225 sewers, subject to external environment (**Notes 1/2**)
2	Cast in Situ Concrete	Only where justified in lieu of precast concrete assembly (**Notes 4/5**)
3	Clay Brickwork	Legacy assets only (not for new assets – **Note 5**)
4	Discharge	Internally protected AC to receive pumped/drop sewer inflows (**Note 3**)
5	Micro-Tunnelling (Concrete)	Bespoke AC sized to accommodate the nominated tunneling equipment
6	Plastics-Lined Precast Concrete	AC on sewers ≥ DN 300, subject to external environment (**Notes 1/2**)
7	Plastics-Lined Cast in-Situ Concrete	Only where justified in lieu of precast concrete AC assembly (**Notes 4/5**)
8	Plastics Maintenance Shaft	Only where permissible in lieu of concrete AC (**Note 5**)

TABLE 3 REQUIREMENTS:

1. Type 1 ACs are intended solely for exposure to internal environments that are non-aggressive or mildly aggressive. Type 6 ACs are internally lined to withstand internal environments that are moderately or severely aggressive. Internal and external ‘aggressivity' exposure classifications are as defined in AS 4198.
2. Where precast concrete AC products may potentially be exposed to moderately or severely aggressive external environments, they shall be designed for long term resistance to such exposures, in accordance with Clause 3.3 below.
3. A Type 4 discharge chamber may be equivalent to a Type 6 precast concrete access chamber or, where otherwise permissible, a Type 8 maintenance shaft.
4. The use of in-situ concrete access chambers may be considered only where, by agreement with the Corporation, use of a precast concrete access chamber proves impracticable on the basis of documented cost/risk analysis.
5. **Non-precast concrete** Type 2, 3, 7 and 8 ACs are listed for information and context only.

The nominal internal diameter of a primary access chamber structure shall be one of 1050, 1200, 1500, 1800 or 2100 mm in accordance with the nominal chamber sizes nominated on the relevant project drawings. Precast access chamber shaft assemblies and components shall be in accordance with AS 4198. Access chamber conversion slab and pre-cast concrete cover surround dimensions together with access cover arrangements shall be in accordance with those shown on the standard and example access chamber and valve pit drawings for each particular cover configuration, as referenced in Section 7/Appendix A.

> **NOTE**:DS 51 requires a wastewater pumping station inflow invert level no deeper than 6 metres, for system lifetime economy. This necessarily limits upstream sewer and access chamber inverts to values not exceeding 6 metres. Accordingly, deeper sewer and access chamber depths in pumped catchments (e.g. to service deep legacy sewers, replace existing deep legacy pumping stations or other justified special project needs) are not permissible except where justified by considered AC system engineering and life cost analyses.

The clear opening dimensions of access chamber entry components (typically above the upper surface of a conversion slab) shall be sufficiently spacious to accommodate safe person entry and person movement ergonomics and shall not be less than the clear access opening (AS 3996 defined CO) dimensions shown on relevant project drawings.

Pre-cast component dimensions and dimensional tolerances shall be supported by the Supplier's formal product drawings to be submitted and duly signed by the component design engineer, as a pre-requisite part of component authorisation for use in Corporation infrastructure.

3.3 Structural and Durability Design Basis

Access chamber structural assemblies and components, from concrete access cover surround to concrete base component underside, shall be designed to safely bear the required proof and ultimate load testing, without loss of performance. Applicable proof and ultimate test load values and load cases shall be in accordance with AS 4198 Clause 3.2. Vertical test load case 1, corresponding to an AS 5100.2 defined W80 single wheel load, shall be applied to all access chamber sizes. Vertical test load case 2, corresponding to an AS 5100.2 defined M1600 multi-wheel axle load, shall also - in addition to load case 1 – be applied to access chamber sizes larger than DN 1200.

Pre-cast concrete access chamber assemblies and components shall be designed for durability, in conformity with the requirements of AS 4198. They shall be designed for long term failure-free exposure to **internal** sewerage fluid and gaseous environments. Finished assemblies shall be designed and categorized in terms of specific internal resistance to **mildly, moderately or severely aggressive** exposure, in accordance with the internal exposure classifications defined in AS 4198.

They shall also be designed for long term failure-free exposure to **external** soil and groundwater borne corrodants. Finished assemblies shall be designed and categorized in terms of specific external resistance to **mild, moderate** or **severe** exposure, in accordance with the external exposure classifications defined in AS 4198, being
(**a**) **Mild** - pH > 5.5; chlorides < 2000 ppm;
(**b**) **Moderate** - pH < 5.5, > 4.5; chlorides > 2000, < 8000 ppm; and
(**c**) **Severe** - pH < 4.5; chlorides > 8000 ppm.

Design and classification rating for resistance to moderate or severe external exposure may be achieved by the application of special long-term corrosion protection regimes, as defined in AS 4198, including:

- The use of higher grade concrete material and mix specifications;
- Configuring greater depth of (sacrificial) concrete cover to steel reinforcement;
- Isolating concrete surfaces from potential exposure to corrosive environments by means of physical anti-corrosion barriers and applied coatings, supported by acceptable performance specifications; or
- The application of de-acidifying soil treatments and the control/management of AC surround materials to eliminate or mitigate external aggressivity levels in the vicinity of ACs.

> **NOTE**: The long-term keying-in, adhesion and durability characteristics of applied corrosion protection systems should be capable of being verified by means of acceptable durability performance test methods, as part of AC product inspection and test plan requirements (Section 8/Appendix B) of this Specification.

Access chamber manufacturer-claimed structural and corrosion resistance performance shall be capable of being verified by means of a design basis review by an independent professional structural/corrosion engineer for the stated access chamber assembly size/depth parameters and rated internal/external exposure classifications.

3.4 Component Sealing and Jointing

The ends of circular pre-cast access chamber components that are intended to be joined to mating components (e.g. shaft sections) shall be formed to close dimensional tolerances so that, when components of the same nominal diameter are assembled and jointed,:

- adjoining components are mutually concentric in terms of dimensional fit and structural continuity;
- joint dimensional clearances are adequate to install appropriate elastomeric, compressible or structural joint sealants with mechanical and deformation performance characteristics that will provide and maintain uninterrupted joint installation performance in long-term service;
- joint load bearing continuity and tightness performance is assured over a nominated (agreed) range of component flexural (vertical, horizontal and rotation) movement relative to a mating or inter-locking component.

For wastewater and drainage access chamber (water-tight to 90kPa) applications, elastomeric joint seal components shall be NBR or SBR in accordance with AS 1646 and joint performance shall be in accordance with ASTM C443M or ASTM C1628. An appropriate elastomeric seal IRHD hardness shall be nominated by the component joint manufacturer, based on pre-cast access chamber system joint design characteristics.

For applications where joint water-tightness is not a specified requirement (e.g. dry soil-tight valve pit joints), joint sealing shall be effected by means of pre-formed flexible joint sealant in accordance with ASTM C990M including the application of a compatible joint surface primer for effective long term adhesion and seal.

The conformity of finished pre-cast concrete access chamber component joint dimensions, joint elastomers and sealants with requirements shall be capable of being verified in accordance with Section 6 of this Specification including an acceptable inspection and test plan as described therein.

The dimensional fit performance of mating (e.g. spigot to socket) component joints that, typically, form part of an access chamber assembly submission (e.g. pre-cast concrete shaft and base assembly) shall also be capable of being verified in accordance with Section 6. This requirement shall prevail, notwithstanding the incorporation by the Supplier of assembly components manufactured by others and notwithstanding whether or not a component has been already authorised as part of another (different) assembly submission.

NOTES:
1. Natural rubber (NR) and EPDM are non-preferred elastomers for wastewater (sewage) conveyance applications – particularly for continuous exposure to undiluted wastewater borne fluids, solids, oils and gases.
2. ASTM C1628 (for concrete pipe) specifies more stringent elastomeric joint seal design and performance requirements than ASTM C443M (for concrete pipe and manholes) in terms of concrete joint dimensional tolerances, joint taper angles, intra-joint movement/deflection as well as elastomeric gasket dimensional tolerances and material mechanical characteristics.
3. Where the minimum specified requirement is for joint soil-tightness (but not water-tightness e.g. valve pit applications), joint seal performance in accordance with ASTM C443M (water-tight jointing) remains an acceptable, albeit more stringent, alternative to ASTM C990M (soil-tight jointing). Joint performance in accordance with ASTM C877M (external seal banding) may be considered for applications where soil-tightness but not water-tightness is required (e.g. where joint seal remedial/repair work on existing installations is required, subject to a supporting rational business justification.

3.5 Buoyancy Design Basis

The buoyancy balance of each type of precast concrete access chamber or pit assembly (Types 1, 4 and 6, for example, as defined on Drawing No. AA01-3-1) shall be analysed and designed for ultimate limit state load action combinations in accordance with AS 1170, with particular reference to AS 1170.0 Sub-clause 4.2. Analysis and design shall provide for access chamber assembly installation in buried applications across WA, irrespective of location. The design basis shall be sufficiently robust to obviate the need for project-specific geotechnical and buoyancy balance analyses at individual installation locations.

For acceptance, in the absence of individual access chamber assembly buoyancy balance checks on a project by project site basis, the following installation, geotechnical and site risk mitigation constraints shall apply:

1. Access chamber assembly mass and buoyancy up-thrust load balance shall be analysed for a range of installation depths ($\leq$ permissible depth) and a given groundwater level condition (at finished surface level, for example), duly factored in accordance with the load and buoyancy design factors and soil surround boundary conditions required by DS 50;

   NOTE: In most cases, the critical (or 'worst') load balance case is likely to occur at a chamber depth shallower than the maximum permissible (surface to invert level) depth for a given access chamber type and size.

2. Reasonable (conservative) values shall be applied to or assumed for the physical properties including mass of component access chamber assembly materials;
3. Reasonable (conservative) values shall be applied to or assumed for the physical properties of (typically submerged) materials that access chambers are likely to be embedded in or surrounded by, in accordance with DS 50 requirements. Reliance on a down thrust force contribution from a soil body other than that vertically above horizontal access chamber structure projections shall be limited to the conical soil boundary profile specified in DS 50;

   NOTES:

Any assumption that an entire granular soil embedment mass (up to a conical profile angle ≤ soil angle of internal friction, for example) can monolithically and uniformly resist access chamber buoyancy up-thrust forces in a predictable way is unsafe, given:

- The unpredictability of soil material classification, mechanical characteristics, compactability and saturation (in groundwater) levels likely to be encountered across WA wastewater and drainage conveyance project sites into the future;
- The (unsafe) amount of upward access chamber structure movement required to activate a particular 'down-thrust force contribution by chamber soil embedment (≤ soil mass plus developed soil/chamber friction) and the structural implications of such upward movement;
- In geotechnical practice, only a miniscule nominal upward structural movement is safely achievable if damage to the chamber and its interconnected pipework is to be avoided. In practice also, a conical mass of granular soil is unlikely to behave monolithically (the larger the less likely) due to a multitude of 'mini' shear failures during an 'uncontained' uplift and is extremely unlikely to develop a down-thrust force that approaches full soil mass plus developed soil/chamber friction capability;
- The active soil/passive soil interface coefficient of frictional resistance **f** is, in practice, most unlikely to achieve a developed value in excess of 0.3 times the value of the measured internal soil friction angle **Ø**, in common saturated soil backfill environments.

For acceptance, the factored (0.9 times) self-weight of an access chamber assembly plus the weight of soil placed vertically above external chamber projections and the soil within the boundary limits specified in DS 50 shall exceed or equal the factored (1.2 times) buoyancy up-thrust force.

NOTE: The ultimate limit state safety factors (0.9, 1.2 or 1.5, as appropriate) should, wherever applied, be in conformity with the requirements of AS/NZS 1170.0 Clause 4.2.

3.6 Access Covers and Frames

Access covers and frames for access chambers and valve pits shall be configured to provide access clear opening sizes and arrangements for the safe:

- placement, fixing and subsequent removal - for replacement purposes - of the required chamber/pit equipment;
- access and egress by operations personnel for the purposes of operating, maintaining and repairing the equipment.

Typical access opening arrangements and details for access chambers and valve pits are shown on the drawings referenced in Section 7/Appendix A. Access covers and frames for general purposes (no assisted lift) shall be in accordance with SPS 801. Assisted lift covers and frames shall, where specified, be in accordance with SPS 802.

In accordance with structural design basis requirements, all access cover and frame assemblies to be incorporated into pre-cast concrete access chamber - and (valve) pit surrounds - shall be designed to safely bear an imposed ultimate limit state vehicular traffic design load of 240 kN.

A multi-part system of cover/lid components shall span and be directly supported by a mating frame to preclude any need for intermediate beam support across an access opening.

NOTES:

1. A key objective of precluding intermediate cover support beams is to obviate the need for costly inspection and testing of concealed support/beam surfaces by structural experts at safe periodic intervals and preclude potentially fatal collapses/failures of cover assemblies over time. Any contribution to cover system load support that may arise by virtue of overlap between the under-cut and draw-cut profiles of cover/lid components should be duly validated by finite element analysis, engineering calculations and/or performance testing.
2. Access covers and frames that have been authorised for specific wastewater and drainage conveyance purposes, together with relevant conditions of authorisation, may be referenced in the Strategic Products Register.

4 Marking and Packaging

4.1 Marking

Each access chamber component shall be marked in accordance with the marking requirements of AS 4198 except that access cover/frame components shall be marked in accordance with the marking requirements of SPS 801 or SPS 802 (assisted lift) as appropriate or as may otherwise be agreed.

4.2 Packaging

Product shall be packaged with appropriate protection, which shall prevent damage or defects as a result of handling, storage or transportation. Flexible packaging material shall have a minimum expected life in outside storage conditions of 12 months from the date of delivery. Where requested in a Purchasing Schedule, each supplied item shall be identified by prominently and durably denoting the identification markings on the outside of any protective packaging.

4.3 Identification Marking

Wherever requested in a Purchasing Schedule, each supplied item shall be identified in a conspicuous position with the following information:

a. Material Master Record number (MMR);

b. Contract number; or

c. Purchase order number.

5 Transportation, Handling and Storage

5.1 General

Transportation, handling and storage facilities shall be designed to prevent Product damage or defects and to maintain Product free of deleterious matter. Lifting elements shall be designed and installed in accordance with lifting element designer/supplier requirements in conformity with the requirements of the appropriate regulatory authority.

Product shall not be dropped off elevated vehicle platforms or sites. Mechanical handling equipment shall be in accordance with AS 2550.1, AS 2550.3, AS 2550.5 and AS 2550.11 and shall be appropriate to the loads to be lifted. Manual handling shall be in accordance with the National Standard for Manual Handling and the National Code of Practice for Manual Handling, published by National Occupational Health and Safety Commission, Australia. Product restraint during transportation shall be in accordance with Load Restraint Guide—Guidelines for Safe Carriage of Loads on Road Vehicles, published jointly by the Federal Office of Road Safety and the National Road Transport Commission, Australia.

NOTE: Lifting elements in direct contact with Product should be corrosion-resistant and should be installed so that reinforcement corrosion is not induced. They should preferably be of a non-abrasive design e.g. elastomeric or fabric webbing straps. During transportation, Product restraints should be checked for tension at regular intervals of travel and should not be released until the transporting vehicle is resting in a secure stable disposition on level ground.

5.2 Preservation of Product in Storage

Product shall be stored in original Product packaging in accordance with the published requirements of the manufacturer, prior to installation. Sensitive component materials shall be protected from extended exposure to direct sunlight and high temperatures e.g. elastomeric components shall be stored in accordance with the general principles of and guidance in AS 1646. Designated Product storage areas shall be of sufficient size to accommodate Product deliveries and shall be flat, reasonably level and free of combustible vegetation, sharp stones or projections that could cause Product damage or defects.

6 Conformity with Requirements

6.1 General

Product conformity with the specified requirements shall be verified by means of an acceptable inspection and test plan (ITP) in accordance with the "Table of Typical Conformity Inspection and Test Plan Requirements" in Section 8 Appendix B. The ITP shall provide for product component structural and durability design, materials control and performance conformance testing throughout production. The inspection and test plan shall be embodied in a duly accredited ISO 9001 production quality management system.

Product shall be deemed to conform with requirements where test outcomes have been formally verified by a Product Assessor or certified by a Conformity Assessment Body (CAB) in accordance with the requirements of a product standard acceptable to the Corporation. Otherwise, it shall be classified as non-conforming Product.

NOTE: For acceptance, performance testing and calibration laboratories should be accredited as meeting the requirements of AS/NZS ISO/IEC 17025 by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). The scope of laboratory/facility accreditation should include the competencies and capabilities required to execute the particular product testing and calibration work to be undertaken.

6.2 Certification of Product

Products, in respect of which conformity with a particular nominated product Standard(s) is claimed, shall, for acceptance, be assessed in accordance with an acceptable product certification system and shall be subject to the issue of a certificate of conformity with the nominated Standard(s) by a duly accredited CAB.

The certification system or scheme with which product conformity is claimed shall:

- be based on ISO/IEC TR 17026, Conformity assessment -- Example of a certification scheme for tangible products and shall be in accordance with the fundamentals of AS/NZS ISO/IEC 17067 and with the guiding principles of ISO/IEC Guide 28;
- include product type testing from independently sampled production;
- require the manufacturer's production processes and associated controls to be part of a quality management system that has been certified as meeting the requirements of AS/NZS ISO 9001, Quality management systems - Requirements; and shall
- include subsequent verification that the manufacturer routinely continues to maintain effective production control and product conformity with the nominated product Standard(s), at intervals not exceeding 12 months.

NOTE: Evidence of Product conformity with the specified requirements may be by means of a Product Verification Report provided by a Product Assessor including reference to a current relevant water industry appraisal report or certificate issued by WSAA.

6.3 Product Re-verification

Product conformity with the Specification shall be subject to re-verification by a Product Assessor when, during the agreed Product supply period, there occurs any:

- substantive change in Product design, material formulation or performance
- Product failure to perform in operational service to the nominated performance specification.

Re-verification shall require the issue of a new or supplementary Product Verification Report. Product components and test outcomes that are not significantly affected by the Product change or failure may be excluded from the scope of re-verification where already been reported in a current valid Product Verification Report that is acceptable to the Corporation.

6.4 Acceptance Criteria

For acceptance, Product shall be supplied as specified in the Purchasing Schedule.

Prior to the implementation of any arrangement to supply Product, the Supplier shall, in accordance with specified requirements:

- nominate applicable Product Warranty terms; and
- provide documentary verification in the form of a current valid Certificate, an acceptable inspection and test plan (ITP) or Product Verification Report as appropriate to the Product; and
- detail each element of Product that does not conform with the specified requirements together with the extent of non-conformity.

  NOTE : Where the Specification includes Technical Compliance Schedules, the nature and extent of all non-conformity should be provided in accordance with the appropriate Schedules.

6.5 Non-conforming Product

6.5.1 General

Product whose design, workmanship or performance fails to conform to the specified requirements shall be clearly tagged and quarantined by the Supplier as non-compliant and shall be subject to rejection for return to and replacement by the Supplier.

6.5.2 Manufacturing Repairs (In-process)

The Manufacturer shall make provision in its production Quality System and in its ITP for sufficient hold points whenever Product defects are encountered. Production work on non-conforming components shall cease and repair work shall not re-commence until the following details have been confirmed by the Corporation in writing that:

- repair of the non-conforming components in lieu of their replacement is acceptable; and
- proposed repair procedures are acceptable; and
- any proposal to vary the terms of the original Product Warranty as a consequence of the in-process repair is acceptable.

6.5.3 Product Warranty

The Supplier shall replace non-conforming Product with Product that conforms to the acceptance criteria or shall repair or rectify all faults, damage or losses caused by defective Product. Except as may otherwise be specified, the Product Warranty shall indemnify and keep indemnified the Corporation against all losses suffered by the Corporation as a result of non-conforming Product for a period no less than 24 months after Product delivery or 12 months after Product installation, whichever period elapses first.

6.5.4 Product Repair

All reasonable proposals for repair or remedy of defects will be considered, provided that each proposal is accompanied by a methodology statement that accords with the performance objectives of this Specification, as determined by the Corporation. For acceptance, a proposal for repair or remedy of Product defects shall not void or otherwise diminish the provisions of the Product Warranty.

6.6 Access to the Place of Manufacture

The Corporation shall be afforded access, at all reasonable times, to all places of manufacture of Product and shall be authorised to arrange or undertake such testing there as the Corporation deems appropriate to the agreed design proving or testing regime.

7 Appendix A: Reference Drawings (Informative)

The following drawing lists have been extracted from the standard and example drawing lists that are associated with the requirements of design standards DS 50 and DS 51 in order to illustrate configuration and structural concepts for typical pre-cast concrete access chambers and valve pits in Corporation wastewater and drainage applications. Standard square in situ RC and plastics-lined access chamber drawing references are included to inform pre-cast concrete products suppliers who may elect to offer commercially competitive pre-cast product alternatives. Applicable current standard and example drawing detail requirements should be established solely by reference to DS 50 and DS 51.

DS 50 - Design and Construction Requirements for Gravity Sewers DN 150 to DN 600	
DRAWING	**TITLE**
AA01-27-1	Circular Precast Concrete Access Chambers for DN150 & DN225 Sewers up to 12m Deep Sht 1 of 3
AA01-27-2	Circular Precast Concrete Access Chambers for DN150 & DN225 Sewers up to 12m Deep Sht 2 of 3
AA01-27-3	Circular Precast Concrete Access Chambers for DN150 & DN225 Sewers up to 12m Deep Sht 3 of 3
AA01-34-1	Square Plastic Lined Concrete Access Chambers for DN300 & DN375 Sewers up to 12m Deep - Sheet 1 of 2
AA01-34-2	Square Plastic Lined Concrete Access Chambers for DN300 & DN375 Sewers Construction Details – Sheet 2 of 2
AA01-35-1	Square Plastic Lined Concrete Access Chambers for DN450 to DN600 Sewers up to 12m Deep – Sheet 1 of 2
AA01-35-2	Square Plastic Lined Concrete Access Chambers for DN450 to DN600 Sewers Construction Details – Sheet 2 of 2
AA01-51-1	Circular Plastic Lined Precast Concrete Access Chambers for DN300 & DN375 Sewers up to 12m Deep – General Arrangement
AA01-51-2	Circular Plastic Lined Precast Concrete Access Chambers for DN450 to DN600 Sewers up to 12m Deep – General Arrangement
AA01-51-6	Circular Plastic Lined Precast Concrete Access Chambers for DN300 to DN600 - Sewers Pipe Connection Details – Precast Bases
AA01-55-1	Circular Precast Concrete Access Chambers - Micro Tunnelling for DN150 & DN225 PVC less than 12.0m Deep
AA01-76-1	Access Chamber Covers – Reinforced Concrete Surrounds to Cast Iron Covers and Frames

DS 51 - Design and Construction of Wastewater Pumping Stations & Pressure Mains (4 to 180 l/s capacity)	
DRAWING	**TITLE**
CA01-5-3	Type 40 Pumping Stations And Smaller Emergency Overflow Details
CA01-5-4	Type 90 Pumping Stations - Emergency Overflow Details
CA01-5-5	Pumping Stations With Pump Rate Not Exceeding 14L/S, Emergency Overflow Details – Bubble Up Access Chamber Discharge
TYPE 6 PUMPING STATION	
CA01-8-1	Type 6 Pumping Station - General Arrangement And Details
TYPE 10 PUMPING STATION	
CA01-9-20	Type 10 Pumping Station - No Valve Pit - General Arrangement
CA01-9-21	Type 10 Pumping Station - No Valve Pit - General Arrangement – Decontactor
CA01-9-22	Type 10 Pumping Station - No Valve Pit - Structural Details – Precast Components
CA01-9-27	No Valve Pit - Structural Details – Precast Components - Decontactor
TYPE 40 PUMPING STATION (DN 150 pipework with valve pit)	
CA01-10-2	General Arrangement - DN150 Pipework
CA01-10-5	Structural Details - Precast Components
CA01-10-6-1	Precast Slabs And Covers – Temporary Guardrail System
CA01-10-6-2	Precast Slabs And Covers – Temporary Guardrail - Reinforcement
CA01-10-6-3	Precast Slabs And Covers – Permanent Guardrail System
CA01-10-6-4	Precast Slabs And Covers – Permanent Guardrail - Reinforcement
TYPE 40 PUMPING STATION (DN 100 pipework without valve pit)	
CA01-10-20	General Arrangement – DN100 Pipework
CA01-10-21	Structural Details – Precast Components
CA01-10-22-1	Precast Slabs And Covers – Temporary Guardrail System
CA01-10-22-2	Precast Slabs And Covers – Permanent Guardrail System
TYPE 40 PUMPING STATIONS (with electrical decontactor, DN 150 pipework and valve pit)	
CA01-15-3	Structural Details - Precast Components
CA01-15-8	Type 40 Pumping Station with Electrical Decontactor 22Kw To 37Kw - General Arrangement – DN150 Pipework

TYPE 40 PUMPING STATION (with electrical decontactor, DN100 pipework and without valve pit)	
CA01-15-20	Electrical Decontactor Up To 22Kw - General Arrangement No. 1 – DN100 Pipework
CA01-15-21	Electrical Decontactor 22Kw To 37Kw - General Arrangement No. 2 – DN100 Pipework
CA01-15-22	Structural Details – Precast Components
TYPE 90 PUMPING STATIONS	
CA01-20-1-1	Pump Well Cast Insitu – General Arrangement – Sheet 1 Of 2
CA01-20-1-2	Pump Well Cast Insitu – General Arrangement – Sheet 2 Of 2
CA01-20-3	Pump Well Cast Insitu – Structural Details
CA01-20-5	Pump Well Cast Insitu – Reinforcement Details
CA01-20-7-1	Valve Pit Cast Insitu – Structural And Reinforcement Details
CA01-20-9	Pump Guide Rail Support, Lifting Chain Hook & Lifting Chain Details
CA01-20-20-1	Pump Well Precast – General Arrangement- Sheet 1 Of 2
CA01-20-20-2	Pump Well Precast – General Arrangement- Sheet 2 Of 2
CA01-20-21-1	Pump Well And Valve Pit Precast – Structural
PRESSURE MAIN Air/Scour Valve and Flowmeter Pit Arrangements	
CA01-52-2	DN300 Pressure Mains (other than PE) - Air Valve Arrangement and Details
CA01-52-3	DN375/400 Pressure Mains (other than PE) - Air Valve Arrangement and Details
CA01-52-5	DN315, 355, 450, 560 & 630 PE Pressure Mains - Air Valve Arrangement and Details
CA01-54-2	DN80 To DN300 Pressure Mains (other than PE) - Scour Valves - Deep Valve Pit (Depth to IL 2.3m and greater)
CA01-54-3	DN200 To DN300 Pressure Mains (other than PE) - Scour Valves - Shallow Valve Pit (Depth to IL less than 2.3m)
CA01-54-4	DN375/400 Pressure Mains (other than PE) - Scour Valves - Shallow Valve Pit (Depth to IL less than 2.3m)
CA01-54-5	DN375/400 Pressure Mains (other than PE) - Scour Valves - Deep Valve Pit (Depth to IL 2.3m and greater)
CA01-54-7	DN250 - DN630 PE Pressure Mains - Scour Valves - Deep Valve Pit (Depth to IL 2.3m and greater)
CA01-54-8	DN250 To DN630 PE Pressure Mains - Scour Valves - Shallow Valve Pit (Depth to IL less than 2.3m)
CA01-57-1	Magnetic Flow Meter Installation – Shallow Arrangement
CA01-57-2	Magnetic Flow Meter Installation – Deep Arrangement
PRESSURE MAIN Air/Scour Point Arrangements (No Pits)	
CA01-52-1	DN80 To DN250 Pressure Mains (other than PE) - Air Release Point Arrangement & Details
CA01-52-4	DN125, DN180 & DN250 PE Pressure Mains - Air Release Point Arrangement & Details
CA01-54-1	DN80 To DN150 Pressure Mains (other than PE) – Scour Points - Arrangement without Valve Pit (Depth to IL less than 4m)
CA01-54-6	DN125 & DN180 PE Pressure Mains - Scour Points - Arrangement without Valve Pit (Depth to IL less than 4m)

8 Appendix B: Table of Inspection and Test Plan Requirements (Normative)

Pre-cast Reinforced Concrete Access Chamber Component Testing Plan (for conformity with SPS 700/AS 4198)										
No.	***Test characteristic***	**Test method reference**	**Precast Access Chamber test frequency**	**Access Chambers (Type 1, 6 and Air/Scour Valve & Meter Pits)**						
				Shaft Section/Liner		**Spacers/Make-up rings (Note 1)**		**Other components**		**Conc. Access cover/frame**	
				TT	**RT**	**TT**	**RT**	**TT**	**RT**	**TT**	**RT**
1a	***Ultimate load vertical*** – **Refer Note 1a** *to validate ultimate precast concrete component vertical load-carrying capacity prior to production .*	AS 4198 Table 3.2.2, Clause 6.4.1 and Appendix C	Once	R	N/A	R	N/A	R **Note 6**	N/A	R	N/A
1b	***Ultimate load horizontal*** – **Refer Note 1b** *to validate ultimate precast concrete* ***shaft*** *resistance to horizontal lateral earth pressures induced by traffic wheel loads at the road surface, prior to production*	AS 4198 Table 3.2.3, Clause 6.4.1 and Appendix C	Once	R	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2a	***Proof load vertical*** – **Refer Note 1a** *to routinely validate precast concrete component vertical load-carrying capacity, during production.*	AS 4198 Table 3.2.2, Clause 6.4.2 and Appendix C	1st product then 1 in 200 or ≥ 1 per 2 production months	R	R	R	R	R **Note 6**	R **Note 6**	R	R
2b	***Proof load horizontal*** – **Refer Note 1b** *to routinely validate precast concrete* ***shaft*** *resistance to horizontal lateral earth pressures induced by traffic wheel loads at the road surface, during production.*	AS 4198 Table 3.2.3 Clause 6.4.2 and Appendix C	1st product then 1 in 200 or > 1 per 2 production months	R	R	N/A	N/A	N/A	N/A	N/A	N/A
3a	***Cover - AS 4198 precast component*** – **Refer Note 2** *to verify conformity of precast concrete component cover to reinforcement with requirements.*	AS 4198 Tables 2.4.2, 2.4.3 &2.4.4 and Appendix D	1st product then 1 in 200 or ≥ 1 per 2 production months	R	R	R	R	R **Note 6**	R **Note 6**	R	R
3b	***Cover*** (AS/NZS 4058 Table 3.1) ***AS 4058 pipe component*** – **Refer Note 2**	AS 4058 Appendix G	1st product then 1 in 200 or ≥ 1 per 2 production months	R	R	N/A	N/A	N/A	N/A	N/A	N/A
4a	***Water absorption - AS 4198 precast component*** – **Refer Note 3** *to verify resistance of precast concrete component to water absorption.*	AS 4198 Table 2.4.5 and Appendix E	1st product then 1 in 200 or ≥ 1 per 2 production months	N/A	N/A	R	R	R **Note 6**	R **Note 6**	R	R
4b	***Water absorption - AS 4058 pipe component*** – **Refer Note 3**	AS 4058 Appendix F	≥ 1 per concrete mix design per 2 months	N/A	R	N/A	N/A	N/A	N/A	N/A	N/A
5a	***Hydrostatic or Vacuum testing of precast shaft & base components***– **Refer Note 4** *to verify resistance to internal hydrostatic pressure without failure*	AS 4198 Clause 6.4.5 and Appendix F or Clause 6.4.7 and AppendixG	1st product then 1 in 200 or ≥ 1 per 2 production months, subject to an absolute min of 4 P/A	R	R	N/A	N/A	N/A	N/A	N/A	N/A
5b	***Hydrostatic Test of shaft- AS 4058 pipe component*** – **Refer Note 4**	AS 4058 Appendix D	1st product then 1 in 200 or ≥ 1 per 2 production months, subject to an absolute min of 4 P/A	R	R	N/A	N/A	N/A	N/A	N/A	N/A
6a	***Hydrostatic or Vacuum testing of joint assemblies*** – **Refer Notes 5/6** *to verify resistance of assembled precast concrete component joint to external hydrostatic pressure without failure.*	AS 4198 Clause 6.4.6 and Appendix G or Clause 6.4.8 and Appendix K	1st product then 1 in 200 or ≥ 1 per production month *Test assembly comprising mating shaft/base components.*	R	R	N/A	N/A	R **Note 6**	R **Note 6**	N/A	N/A
6b	***Joint assembly testing of elastomeric seal jointed pipes*** – **Refer Notes 5/6** *to verify pipe assembly joint dimensional fit within tolerances.*	AS/NZS 4058 Appendix H	1st product then 1 in 200 or ≥ 1 per production month *Test assembly comprising mating (AS/NZS 4058) pipe/base components.*	R	R	N/A	N/A	R **Note 6**	R **Note 6**	N/A	N/A
7	***Dimensional accuracy*** *to verify precast concrete component dimensional conformity with requirements.*	AS 4198 Clause 6.4.10	1 in 200 or ≥ 1 per 2 production months	R	R	R	R	R	R	R	R
8	***Workmanship and finish*****/classification of** ***defects***	AS 4198 Clauses 3.5/3.5.5	Each component	R	R	R	R	R	R	R	R
9a	***External exposure classification*** *to establish external resistance to soil and groundwater borne acidity/pH and/or chlorides/salinity as defined in DS 50 Table 4.6* **– Refer Note 7**	AS 4198 Clause 2.2	Each component classified as suitable for (i) mild, (ii) moderate or (iii) severe external exposure	R	R	R	N/A	R	R	N/A	N/A
9b	*Verification of overall access chamber assembly design basis and conformity with requirements* - **Refer Note 8**	Documents/Drawings	Once - Type assembly including joint seal specifications	R	N/A	R	N/A	R	N/A	R	N/A

TT = Type (System Design Proof) Testing; RT =Routine (Production Batch Release) Testing; R = Required; N/A = Not Applicable

NOTES:	
1a	Ultimate (type) and proof `(routine) load testing is required to validate the **vertical** load resistance of all precast access chamber components. Evidence of pre-cast spacer/make-up ring load capacity and conformity with AS 4198 may, where agreed as an alternative to type and routine test records, be by means of a design basis review by an independent professional structural engineer as described in Note 8
1b	Ultimate (type) and proof `(routine) horizontal load testing is required to validate the **horizontal** load resistance of access chamber shaft components only. AS 4198 Sub-clause 3.2.3 nominates the horizontal shaft load test methodology of AS/NZS 4058, subject to the test loads nominated in AS 4198 Table 3.2.3.
2	Evidence of access chamber/pit shaft section, base section, (concrete) access cover and, where practicable, spacer/make-up ring conformity with cover to steel reinforcement requirements shall be provided, irrespective of whether the component (e.g. shaft section) is manufactured/tested in accordance with AS 4198 or AS/NZS 4058. This evidence is required to assure the Corporation of ongoing component design (type) and production (routine) conformity with requirements.
3	Evidence of primary access chamber/pit 'wetted' component conformity with water absorption requirements shall be provided, irrespective of whether a component is manufactured/tested in accordance with AS 4198 or AS/NZS 4058. This evidence is required to assure the Corporation of conformity with requirements and may include tests on samples from components to be destructively tested and cored – particularly where water absorption testing of some finished components may prove impracticable (e.g. integrally plastics-lined components).
4	Evidence of primary access chamber/pit shaft section and pre-cast base (wetted component) conformity with resistance to internal pressure requirements shall be provided, irrespective of whether the component is manufactured/tested in accordance with AS 4198 or, where agreed, AS/NZS 4058. This evidence is required to assure the Corporation of ongoing component design (type) and production (routine) conformity with requirements.
5	Evidence of mating shaft to shaft and shaft to pre-cast base joint integrity (joint conformity with dimensional and pressure-tightness/seal requirements) shall be provided, irrespective of whether the component is manufactured/tested in accordance with AS 4198 or, where agreed, AS/NZS 4058. This evidence is required to assure the Corporation of ongoing component assembly design conformity with requirements.
6	Other components include pre-cast concrete base units (each comprising an integral shaft section, structural base and, sometimes, benching). Evidence of base unit structural and water-tightness integrity (conformity with load bearing and resistance to internal pressure requirements) shall be provided, given base position as the lowermost load bearing/water retaining structure with the greatest exposure to failure consequences in the event of structural or water-tightness defects.
7	Precast concrete components shall be classified for a specific level of external exposure to acidity/pH and chlorides/salinity as defined in DS 50 Table 4.6. Precast concrete shaft/base assemblies will be specifically authorised on the basis of proven long-term resistance to a **mild**, **moderate** or **severe** external exposure classification, as appropriate. A nominated exposure classification shall be supported by documented (e.g. process QC) evidence of concrete aggregate and cement constituents, blends and mix/strength design as well as reinforcing material specifications and minimum cover to (steel) reinforcement – in alignment with AS 4198 requirements for the nominated exposure.
8	A supplier who elects to offer a pre-cast access chamber/pit assembly for acceptance/authorisation by the Corporation shall provide documentary evidence of component conformity with performance requirements, whether or not sourced from a third party supplier/ manufacturer of another (different) authorised assembly. Evidence of product conformity with specified requirements should include design basis review by an independent professional structural engineer for a range of sub-surface depths up to the nominated maximum depth. This review should include signed-off drawings for all components of an access chamber assembly, duly supported by engineering design/calculations as appropriate.

9 Appendix C: Material Master Records (Informative)

The following Material Master Records (MMR) comprise Corporation catalogue numbers that are unique to the particular products described for the purposes of Corporation activities or work.

MMR	PURCHASE ORDER LONG TEXT (Access Chamber)
8190	Access Chamber, Sewer; Circular; Pre-cast Concrete; DN1066 x 300mm Length; Stepped Joint to Accept Butyl Mastic Sealing Strips. Note: To be Manufactured in Accordance to Water Corporation Drawing AA01-27-1.
18014	Access Chamber, Sewer; Circular; Pre-cast Concrete; DN1066 x 450mm Length; Stepped Joint to Accept Butyl Mastic Sealing Strips. Note: To be Manufactured in Accordance to Water Corporation Drawing AA01-27-1.
21820	Access Chamber, Sewer; Circular; Pre-cast Concrete; DN1066 x 600mm Length; Stepped Joint to Accept Butyl Mastic Sealing Strips. Note: To be Manufactured in Accordance to Water Corporation Drawing AA01-27-1.
8153	Access Chamber, Sewer; Circular; Pre-cast Concrete; DN1066 x 900mm Length; Stepped Joint to Accept Butyl Mastic Sealing Strips. Note: To be Manufactured in Accordance to Water Corporation Drawing AA01-27-1.
8154	Access Chamber, Sewer; Circular; Pre-cast Concrete; DN1066 x 1200mm Length; Stepped Joint to Accept Butyl Mastic Sealing Strips. Note: To be Manufactured in Accordance to Water Corporation Drawing AA01-27-1.
8155	Access Chamber, Sewer; Circular; Pre-cast Concrete; DN1066 x 1500mm Length; Stepped Joint to Accept Butyl Mastic Sealing Strips. Note: To be Manufactured in Accordance to Water Corporation Drawing AA01-27-1.

MMR	PURCHASE ORDER LONG TEXT (Make Up Ring)
20478	Make Up Ring, Manhole; Internal Opening, 630MM; Depth, 100MM; Material, Concrete.
20477	Make Up Ring, Manhole; Internal Opening, 630MM; Depth, 150MM; Material, Concrete.

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