

**0801 HYDRAULIC SYSTEMS****1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide the hydraulic services, as documented.

Summary: The hydraulic services are summarised as follows:

- Sanitary Plumbing
- Trade Waste System
- Cold and Hot Reticulated Water System

Include for items scheduled below and all items necessary for successful and economical operation and to meet the intent of the Contract Documents, including minor items not specifically included in these document.

This Contractor shall be deemed to have inspected the site, made allowances for all difficulties of access, installation, staging, testing, commissioning, procurement, noise and vibration control etc and shall utilise their own experience and expertise determine detailed design and installation allowances to achieve the objectives of the Contract Documents.

This Contractor shall ensure that all the required authority application and connection fees for the site services connections are made to the authorities prior to commencing work onsite.

**Cold water services:**

- Make application and pay all fees for removal of existing 20mm SA Water domestic water meter
- Make application and pay all fees for new 32mm SA Water domestic water meter
- Extend water service into building and reticulate as documented
- Extend water services to fixtures
- Pipework, valves and fittings
- Pipework insulation for noise control
- Buried metallic pipes protected against corrosion by continuous wrapping in petrolatum tape to AWW C217.

**Backflow Prevention**

- Backflow prevention valve (TDCV) on supply to screw nosed bibcock for grease arrestor washdown on basement floor.
- External Back Flow Prevention (Testable Double Check Valve (DCV)) valve arrangement on the incoming water supply immediately downstream of the site water meter. Valve arrangement mounted above ground. Cover valve arrangement with a removable lockable cover fixed to a concrete base.

**Heated water services**

- Supply and install wall mounted Instantaneous electric hot water units including support brackets, associated pipework, valves and fittings and electrical wiring.
- Hot water supply from units to fixtures
- Pipework, valves and fittings
- PVC conduits for under floor pipework
- Thermal pipe insulation
- Thermostatic Mixing Valves including valve box.

**Soil, Waste and Vents**

- Locate and connect to existing SA water 100mm sewer connection
- Supply and install sewer pump station in basement with associated pump well, pumps, pipework, valves, control boxes and alarms.
- Soil, waste and vents

- Wrap plumbing drains passing through footings
- Pipework and fittings
- Vents terminating above roof in vent cowl

**Grease Arrester**

- 1000L pre-cast concrete grease arrester as detailed on drawings complete with vent, removable trafficable airtight lids
- Extend Trade waste Drains to grease arrester as documented
- Provide adjacent screw-nosed bibcock for washdown
- Pipework, valves and fittings

**Sanitary Fixtures**

- Sanitary fixtures including plug and washer

**Tapware**

- Tap fittings and valves, including breeching pieces, spouts and outlets
- "Fluid Apron" to tapware

**General**

- Pipework supports and fixings related to the above services
- Timber frames and supports for fixtures and fittings
- Openings in bench tops for sinks
- Openings in vanity units for basins
- Identification and labelling of pipework, valves and equipment
- Painting of equipment
- Wall and floor penetrations
- Coring wall and floor penetrations
- Sealing of wall and floor penetrations to approval
- Pipework supports and hangers to suspended pipework within concealed spaces.
- Excavation, trenching, bedding, backfilling and compaction as required for the above services
- Shoring of trenches as required.
- Allow to revisit the site twelve months after the installation or when directed by the Client to re compact, fill and grade any trenches that have subsided.
- Provide appropriate approved safety barriers and signage around excavations
- Cut and chase brick and block walls
- Electrical wiring and controls associated with the above equipment
- Access panels and inspection openings
- Roof penetrations and upstands.
- Weatherproof overflashings to roof penetrations.
- Noise and vibration control associated with the above systems
- Testing and Commissioning of the above systems.
- Testing and labelling of Back Flow prevention valves.
- Operating and Maintenance Manuals
- Shop drawings
- "As-Installed" drawings
- Equipment warranty, maintenance and servicing of the above systems for 12 months from the date of practical completion.
- Hoisting of all equipment
- All required scaffolding
- Coordination of installation with all other trades
- Water and Sewer Authority Inspection Fees

**Associated Works**

Include items scheduled below and all items necessary for successful and economical operation and to meet the intent of the Contract Documents for a fully automatic durable and trouble free system of hydraulic services, including matters of minor design not specifically included in this document, shall be provided.

The Builder shall be deemed to have inspected the site, made allowances for all difficulties of access, installation, staging, testing commissioning, procurement, noise and vibration control, etc and made allowance for the following:-

- Timber frames and supports for fixtures and fittings
- Openings in bench tops for sinks
- Openings in vanity units for basins
- Roof penetrations and upstands
- Access panels
- Electric wiring to Chilled / Boiling water unit
- Electrical wiring and connection to electric hot water unit and circulating pump

## 1.2 DESIGN

### Hydraulic constraints

Constraints: Site and other constraints on this project are as follows:

#### Design for durability and maintainability

Design for durability: Develop the design so the systems achieve the documented performance, reliability, service life, energy efficiency and safety requirements, and are easily maintainable.

Access for maintenance: Develop the design so the systems conform to **ACCESS FOR MAINTENANCE** in the 0171 *General requirements* worksection.

#### Hydraulic system design

General: Design and provide systems as documented.

Outline Description: The works include but are not necessarily limited to the works referred to in the outline description given below.

Items not included in the specification but shown on the drawing or visa versa shall be included.

### Authority requirements and constraints:

Allow for all Local Regulatory Authorities, Permits, Approvals, Application Fees and costs associated with works and Certificates of Satisfactory Completion.

Authority submissions: Make submissions (including notices) to authorities relating to the works.

Authorities: The public and other authorities whose requirements shall apply to the work in this Section in accordance with the General Conditions and the ordinances, regulations, by-laws and the like specifying those requirements, shall include the following:-

- Office of the Technical Regulator
- SA Water Corporation
- Safe Work SA
- National Construction Code (NCC)
- South Australian Metropolitan Fire Service (SAMFS)
- SA Power Networks
- Gas Authorities
- Any other Authorities having jurisdiction over the Works

Lodgement: Complete and lodge all necessary forms (including technical sections) for the submission of applications and approvals to the relevant authorities.

Approvals: The documents evidencing approval of such authorities, which are to be surrendered before the Certificate or Notice of Practical Completion is issued, shall include the authority's official certificate of completion.

Authorities Mark: Pipes, fittings, accessories and the like used shall bear approval marks where and as required by the regulatory authority.

Designer qualification: Use only appropriately experienced and qualified persons to undertake design work. If requested, provide documents verifying the qualification and experience.

### 1.3 PRECEDENCE

#### General

Order of precedence:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of the worksections override conflicting requirements of their referenced documents. The requirements of the referenced documents are minimum requirements.

### 1.4 CROSS REFERENCES

#### General

Requirement: Conform to the following:

- *0171 General requirements*.

### 1.5 INTERPRETATION

#### Definitions

General: For the purposes of this worksection the definitions given in the *0171 General requirements* worksection apply.

### 1.6 STANDARDS

#### General

Microbial control: To AS/NZS 3666.1, AS/NZS 3666.2 and the recommendations of SAA/SNZ HB 32.

Sanitary plumbing and drainage: To AS/NZS 3500.2.

Water supply: To AS/NZS 3500.1.

### 1.7 CONTRACT DOCUMENTS

#### General

Requirement: Conform to the *0171 General requirements* worksection.

Drawings: The following drawings form an integral part of this specification:-

<b>Drawing No:</b>	<b>Description:</b>
B8014/H01	Hydraulic Services: Drainage - Basement and Ground Floor Layout
B8014/H02	Hydraulic Services: Reticulation - Basement and Ground Floor Layout
B8014/H03	Hydraulic Services: Drainage – First, Second & Third Floor Layout(s)
B8014/H04	Hydraulic Services: Reticulation – First, Second & Third Floor Layout(s)

### 1.8 SUBMISSIONS

#### General

Requirement: Conform to the *0171 General requirements* worksection.

#### Certification

Requirement: Submit certification that the plant and equipment submitted meets the requirements and capacities of the contract documents except for departures that are identified in the submission.

#### Electrical loading

Loading: Submit for all equipment before completion of the main switchboard shop drawings.

Loading and connection: Submit the information for items not supplied from the services switchboards.

Starting characteristics: Submit details for motors with reduced current starting. Make sure starting characteristics are within the characteristics of the respective submain protection devices.

Switchboards: Submit the following information for each building services switchboard:

- Board location and designation.
- For each submain connected to the board, submit the following for each item connected to it:
  - . Submain designation.
  - . Item designation and name.
  - . Power rating in kW.

- . Number of phases.
- . Full load amps per phase.
- . Power factor.
- . Total amps on each phase for respective sub main.

**Maintenance program**

General: Submit details of maintenance procedures and program, relating to installed plant and equipment, 6 weeks before the date for practical completion. Indicate dates of service visits. State contact telephone numbers of service operators and describe arrangements for emergency calls.

**Substitutions**

If intending to provide a substitute for the specified equipment, pipework, insulation, valve etc with an alternative product, provide full technical data and details of the proposed system (equipment etc.) to be installed for Approval at time of tender. Failure to obtain the approval at tender time will mean that the proposed alternative cannot be used

**Operation and maintenance manuals**

Requirement: Conform to the *0171 General requirements* worksection.

**Products and materials**

Equipment: Documented pump heads are based on provisional equipment selections and estimated pressure drops. Before ordering equipment, calculate the respective system pressure losses based on the equipment offered and layouts shown on the shop drawings and submit the proposed selections.

Data: Submit technical data for all items of plant and equipment, including the following:

- Assumptions.
- Calculations.
- Model name, designation and number.
- Capacity of all system elements.
- Country of origin and manufacture.
- Materials used in the construction.
- Size, including required clearances for installation.
- Certification of conformance to the applicable code or standard.
- Technical data schedules corresponding to the equipment schedules in the contract documents. If there is a discrepancy between the two, substantiate the change.
- Manufacturers' technical literature.
- Type test reports.

**Shop drawings**

Standard: To AS 1100.101, AS 1100.201, AS 1100.301, AS 1100.401 and AS/NZS 1100.501 as applicable.

Requirement: Submit detail drawings at minimum 1:100 scale, showing the following:

- Pipework and equipment layout and sections showing the work to be installed on the level that the services are installed. Do not submit glass floor drawings.
- Long sections of below ground drainage.
- Riser layouts and sections.
- Piping and other schematic drawings including numbering of each valve to correspond to valve tags notation.
- Inclusions: Include the following on the drawings:
  - . Access openings, cover plates, valve boxes and access pits.
  - . Details of control panels including control and power diagrams.
  - . Insulation of piping, fittings and tanks.
  - . Location, capacity, type and other relevant details of water heaters, including supports and safe trays.
  - . Location, type, grade and finish of piping, fittings, valves, meters and pipe supports.
  - . On-site detention pondage areas.
  - . Provision of a temporary fire hydrant service in the construction period.

- . Provision of blue metal back fill to seepage drain system.
- . Provision of erosion control measures.
- . Provision of road barriers and lighting.
- . Provision of site treatment and fire vehicle parking as required adjacent to the fire hydrant booster inlet valve station.
- . Provision of temporary sanitary accommodation for construction workers.
- . Provision of trafficable cover plates in the public domain.
- . Relevant survey levels.
- . Site and floor set out points.
- . Tank stands and supporting structures.

## 1.9 INSPECTION

### Notice

Inspection: Give notice so that inspection may be made of the following:

- Excavated surfaces.
- Concealed or underground services.

## 2 EXECUTION

### 2.1 INSTALLATION

#### Accessories

General: Provide the accessories and fittings necessary for the proper functioning of the systems, including taps, valves, outlets, pressure and temperature control devices, strainers, gauges and pumps.

Isolating valves: In addition to valves required to meet statutory requirements, provide valves to allow safe isolation of parts of the system, with minimum inconvenience to the building occupants, in event of leaks or maintenance.

#### Connections to network utility operator mains

General: Excavate to locate and expose the connection points and connect to the network utility operator mains. On completion, backfill and compact the excavation and reinstate surfaces and elements which have been disturbed such as roads, pavements, kerbs, footpaths and nature strips.

### 2.2 SUPPORT OF PLANT AND EQUIPMENT

#### Support of roof mounted plant and equipment

Platforms: If a horizontal platform is required, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable platform.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

Roof level support: If any of the following apply to roof level support, obtain the advice of a professional engineer:

- The total load from any unit of plant or equipment exceeds 500 kg.
- The load from a unit of plant or equipment to any single support point exceeds 100 kg.
- The average loading of plant and equipment over the area extending 1 m on all sides beyond the plant and equipment exceeds 25 kg/m<sup>2</sup>.

Sloping roofs:

- Roof slope 10° or over: Adopt the roof material manufacturer's documented installation procedures, or seek the advice of a professional engineer.
- Roof slope less than 10°: Provide appropriate continuous supporting members, compatible with the roof material, laid parallel to the span of the roof sheeting. Extend the continuous support members in both directions to the first purlin or joist that is over 1 m from the face of the plant or equipment it supports.

**Support of ground level plant and equipment**

Ground level:

- If the ground slope is 15° or over, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable slab or platform.
- In all other cases, provide proprietary plastic or concrete supports installed with falls that achieve a raised, impervious and water shedding bearing surface.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

**0811 SANITARY FIXTURES****1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide sanitary fixtures, as documented. Refer to Architectural section of this specification for details

**1.2 CROSS REFERENCES****General**

Requirement: Conform to the following:

- 0171 General requirements.
- 0801 Hydraulic systems.

**1.3 INTERPRETATION****Abbreviations**

General: For the purposes of this worksection the following abbreviations apply:

- WC: Water closet.

**1.4 STANDARDS****General**

Design for access and mobility: To AS 1428.1 and AS 1428.2.

**Authorised products**

Standard: Listed in the WaterMark Product Database, unless otherwise required by the network utility operator.

**Labelling**

Water efficiency labelling: Provide only products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS).

**1.5 SUBMISSIONS****Certification**

General: Submit evidence that proposed fixtures are listed in the WaterMark Product Database.

**Samples**

General: Submit samples as documented in the **Sanitary fixtures samples schedule**.

**2 PRODUCTS****2.1 PRODUCTS****Sealants**

General: Use only sealants that do not support microbial growth.

Colour: To match fixture.

**Wash basins**

Standard: To AS/NZS 1730.

**3 EXECUTION****3.1 GENERAL****Storage and handling**

Accessories: Use manufacturer's brackets and accessories if these are available and suitable for the mounting substrate.

Protection: Deliver fixtures to site protected from damage under site conditions by coatings, coverings and packaging. Remove only sufficient protection to permit installation.



### 3.2 INSTALLATION

#### General

Connections: Connect to each fixture supply and waste services. Install plumb and level.

Cutting and fitting: If it is necessary to cut and/or fit substrate to install an item, carry out this before the surface is finished or painted. Remove items when required for painting and protect until re-installed. Cap or plug the open ends of pipes. Reinstall when painting and finishing is complete.

Substrate and fixings: Before installation, make sure that the substrate to which the fixtures are to be installed is adequate for the intended loads and fixings methods. In solid walls, confirm adequacy of the material at fixing locations.

Noggings: In framed construction, provide a solid noggling at each fixing point.

#### Vitreous china fixtures

General: Undertake preparation, assembly, connections to water supply and sanitary plumbing, application of slurries and sealants in sequence. Install the fixture without stressing its attachment points.

### 3.3 FIXTURES

#### Wall hung basins

General: Set basins firmly to walls or vanities as detailed. Connect through trap to the drainage system.

#### Vanities

General: Install to manufacturer's recommendations and details. Seal top and upstand to wall surface. Seal cut surfaces to prevent moisture penetration.

### 3.4 COMPLETION

#### Damage

General: Inspect all work and replace or repair to factory condition damaged or marked fixtures and components.

#### Protective coatings

General: Immediately before the date for practical completion, remove all protective coatings and stickers and clean surfaces. Check and clean debris from traps.

## 4 SELECTIONS

### 4.1 SANITARY FIXTURES

TYPE	LOCATION	SPECIFICATION	TAPWARE	COMMENT
<b>Water Closets</b>				
General	WC	Caroma Liano wall faced toilet suite Model No.766200W	Provide 15mm cistern cock adjacent fixture	
Ambulant	Ambulant WC	Caroma Liano Cleanflush Easy Height wall faced suite with Liano Care single flap toilet seat in Sorrento Blue Model No.866400SB	Provide 15mm cistern cock adjacent fixture	Ensure installation complies with AS1428.1 Ambulant requirements.

Accessible	Accessible WC	Caroma Care 800 Cleanflush Invisi Series II wall faced suite with backrest and Pedigree II care single flap seat Sorrento Blue Model No.718300BSB	Provide 15mm cistern cock adjacent fixture	Ensure installation complies with AS1428.1 Accessible requirements.
<b>Sinks</b>				
	Tea Sink	Clark Advance single centre bowl with 0 tap holes Model No.1512	Caroma Coolibah Contemporary lever wall tap set Model No.90333C5A	
<b>Basins</b>				
General	WC	Caroma Concorde single tap how white vitreous china wall hung basin Model No.631010W	Caroma Skandic single lever basin mixer in chrome Model No.90958C5A	
Accessible	Accessible WC	Caroma Care 700 wall basin with RHS shelf and single tap hole Model No.873310W	Caroma Skandic Care single extended lever basin mixer in chrome Model No.90994C5A	
<b>Shower</b>				
	Tea Sink	Caroma Virtu Plus Starsafe II Inverted T Accessible shower set RH Model No.782740A	Caroma Skandic Shower mixer Model No.90952C	
<b>Urinals</b>				
	Tea Sink	Caroma Leda Invisi Series II Urinal Suite.	N/A	
<b>Thermostatic Mixing Valves</b>				
Thermostatic Mixing Valves		Enware Aquablend 1500 TMV (Refer to Plans for Valve size). Valve mounted in recessed hinged lockable stainless steel valve box.		

**0812 TAPWARE****1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide tapware, as documented.

**1.2 CROSS REFERENCES****General**

Requirement: Conform to the following:

- 0171 General requirements.
- 0801 Hydraulic systems.

**1.3 STANDARDS****General**

Design for access and mobility: To AS 1428.1 and AS 1428.2

**Authorised products**

Standard: Listed in the WaterMark Product Database, unless otherwise required by the network utility operator.

**Labelling**

Water efficiency labelling: Provide only products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS).

**1.4 SUBMISSIONS****Certification**

General: Submit evidence that proposed tapware is listed in the WaterMark Product Database.

**Samples**

General: Submit samples as documented in the **Tapware samples schedule**.

**2 PRODUCTS****2.1 GENERAL****Accessories**

General: Provide escutcheons and cover plates over visible penetrations. Finish and material to match adjacent fixtures.

**Sealants**

General: Use only sealants that do not support microbial growth.

Colour: To match fixture.

**Tap and valve heads**

Metal heads and handles: Provide brass fittings or a suitable bush to prevent electrolysis and growth.

Plastic heads and handles: Provide compact fittings designed to prevent fracture and exposure of jagged or rough edges.

Vandal-proof heads: Provide vandal-proof or anti-tampering devices for the designated types.

**Water efficiency**

Shower heads: To AS 3662 and suitable for the pressures and pressure differences of the supplied water.

Water efficient tapware: Tested and labelled with their water efficiency rating to AS/NZS 6400.

**Thermostatic mixing valves**

Standard: To AS 4032.1.

Requirement: Provide thermostatic mixing valves that automatically control the temperature at the mixed outlet to a preselected temperature and suitable for the number of outlets served by the individual valve.

Controls: Include the following:

- A temperature sensitive automatic control that maintains temperature at the pre-selected setting and rapidly shuts down the flow if either supply system fails, or if the normal discharge water temperature is exceeded.
- Hot water flush facility.

Wall box: House the thermostatic mixing valve in a stainless steel recessed wall box with a hinged door and keyed lock.

### **3 EXECUTION**

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#### **3.1 INSTALLATION**

##### **General**

Requirement: Install to manufacturer's recommendations. Use manufacturer's recommended tools and templates.

##### **Location**

General: Locate to dimensions as documented.

##### **Installation**

General: Install level, plumb and true to line in the required location. Make sure moving parts function freely and without obstruction. Do not modify supplied units.

Seal: Provide resilient seals between fixtures and backnuts.

Fixing: Provide rigid fixing for tapware so that it does not move in normal operation.

##### **Cutting and fitting**

General: If it is necessary to cut and/or fit substrate to install an item, carry out before the surface is finished or painted. Remove items when required for painting and protect until reinstalled. Cap or plug the open ends of pipes. Reinstall items when painting and finishing is complete.

##### **Tap positions**

General: Locate hot tap to the left of, or above, the cold tap.

#### **3.2 COMPLETION**

##### **Adjustment**

General: Inspect and adjust tapware for correct and smooth operation. If adjustment does not rectify incorrect or defective operation, replace units.

##### **Damage**

General: Inspect all work and replace or repair to factory condition damaged or marked fixtures and components.

Foreign matter: Inspect for presence of foreign matter particularly on tap seats. Remove if found. Replace damaged seats.

##### **Protective coatings**

General: On completion of the tapware installation remove all protective coatings and stickers and clean surfaces. Check and clean debris from traps.

##### **Thermostatic mixing valves**

Field testing: To AS 4032.3.

Maintenance: Conform to the *0891 Hydraulic maintenance* worksection.

### **4 SELECTIONS**

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#### **4.1 TAPWARE**

\* REFER TO FIXTURE SCHEDULE FOR FIXTURE AND TAPWARE SPECIFICATION

**0813 WATER HEATERS****1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide water heaters, as documented.

**1.2 CROSS REFERENCES****General**

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0781 *Mechanical electrical.*
- 0801 *Hydraulic systems.*

**1.3 STANDARDS****General**

Heated water services: To AS/NZS 3500.4.

Gas equipment: To AS 3645.

**Authorised products**

Standard: Listed in the WaterMark Product Database, unless otherwise required by the network utility operator.

**Microbial control**

Standard: To AS/NZS 3666.1 and AS/NZS 3666.2.

**1.4 INTERPRETATION****Abbreviations**

General: For the purposes of this worksection the following abbreviations apply:

- CFC: Chlorofluorocarbon.
- HCFC: Hydrochlorofluorocarbons.

**1.5 SUBMISSIONS****Certification**

General: Submit evidence that proposed water heaters are listed in the WaterMark Product Database.

**Warranties**

Requirement: Submit the following:

Warranties extending beyond the end of defects liability period: Make sure that the principal is named as the warrantee.

**2 PRODUCTS****2.1 GENERAL****Insulation**

Prohibition: Do not provide insulation materials that use CFC or HCFC as blowing agent during the manufacturing process.

**2.2 INSTANTANEOUS WATER HEATERS****Description**

General: Provide heaters as documented in the **Instantaneous water heater schedule**.

**3 EXECUTION**

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**3.1 INSTALLATION****General**

Standard: Install to AS/NZS 3500.4.

**4 SELECTIONS**

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**4.1 WATER HEATERS**

<b>Location:</b>	<b>Unit:</b>
Ambulant Toilet L1 -L3	Stiebel Eltron DHE 27
Access Toilet Ground Floor	Stiebel Eltron DHE 18

**0814 HYDRAULIC PUMPS****1 GENERAL****1.1 AIMS****Responsibilities**

General: Provide pumps.

Selections: As documented.

**1.2 CROSS REFERENCES****General**

General: Conform to the *General requirements* worksection.

**Associated worksections**

Associated worksections: Conform to the following:

- *Hydraulic general requirements*.

**1.3 SUBMISSIONS****Products – documentation**

Type tests: Required.

Standard: To AS 2417.

Accuracy of measurement: Grade 2 to AS 2417.

Type test records: Submit type test curves for each size and type of pump.

**2 PRODUCTS****2.1 COMPONENTS****Control panels**

General: Provide control panels to suit the controls. Mount switches, and indicating lights on the door. Mount motor starters, relays and switchgear and terminals on DIN rails inside the cabinet. Run cables in trunking or looms.

Labelling: Label all components. Number both ends of each cable and number terminal strips to match the circuit diagram. Provide a laminated circuit diagram inside the cabinet.

Metalwork: Vandal proof cabinet constructed from metallic zinc coated steel with powder coat finish. Provide a hinged and lockable door with 2 keys.

Protection: Degree of protection IP54 or better.

**Controls – dual pump installations**

General: Provide controls to alternate the pumps after each cycle of operation, start the idle pump if the other fails, and activate an audible alarm and a flashing warning light to indicate a failure.

Alarm bells: Mount on an external wall. Provide alarm mute.

Meters: Provide an hours-run meter to each motor.

Selector: Provide an auto-off-on selector for each pump.

Warning lights: Provide separate lights to indicate power available, run for each pump, fault for each pump and other faults.

**Float switches**

Type: Micro switch. Provide one level switch for each liquid level to be detected.

Construction: Double encapsulated hermetic construction designed for long life submerged. Provide a clamp to permit accurate adjustment of levels.

Cable: Low moisture absorption type.

**Marking**

General: Provide robust labels one each pump or pump set showing design flow rate, head, temperature of pumped medium, casing, impeller and shaft materials.

**Motors**

Dimensions and performance: To IEC 60072-3.

Installation: To AS 1359.107.

Motors  $\geq 0.75$  kW: Three phase, flange mounted.

Overload protection: Provide each motor with overload protection.

Performance:

- Efficiency: Motors documented as high efficiency to AS/NZS 1359.5 Section 3, all other motors to AS/NZS 1359.5 Section 2.
- Power factor at full rated output:  $\geq 0.72$  for single phase motors,  $\geq 0.83$  for three phase motors.

Selection: Provide motors selected for the maximum number of starts per hour of the installed system and to provide efficient, non-overloading pumping sets.

Power rating: At least the maximum power required by the pump when projecting the system resistance curve to the maximum impeller size for the pump casing size.

Degree of protection: IP54 or better.

Shaft: If the impeller is mounted directly on the motor shaft use grade 416 stainless steel for the shaft.

**Pumps – submersible**

Type: Vertical, fully flooded submersible, close coupled, single stage, centrifugal.

Bearings: Deep groove ball type, sealed for life.

Cable: Heavy duty, low water absorption type with replaceable gland seal at the pump.

Casing material: Cast iron to AS 1830 Table1 (ISO 185/JL/250), minimum. Finish outer casing and immersed equipment and fittings with anti-corrosive protective coatings.

- Degree of protection: Water tight enclosure, IP68.

Float switches: Integral.

Impellers: Cast iron, non-clog type.

Motors: Three phase, with windings protected by thermistors and moisture sensor. Provide automatic reset.

Mounting: Provide duckfoot pedestal bases with guide rails or guide wire system.

Nuts and bolts: Stainless steel.

Shaft seals: Replaceable double mechanical type with rotating seal rings of silicon carbide.

Shafts: Stainless steel to ASTM A240/240M.

Suction screens: Stainless steel or plastic.

**2.2 PUMPED DISCHARGE****Description**

General: Provide a pumping system consisting of a wet well to which stormwater or subsoil drainage discharge is gravitated, and from which it is removed by two identical, automatically controlled pumps. Provide necessary piping, valves, rising main, electric wiring and alarms.

**Fully submersible pumps**

General: Connect the pump motor to the control panel via a single continuous length cable, with sufficient slack to allow for adjustment of levels. Provide corrosion-resistant chains attached to the pump casing, to enable the pump to be raised and lowered from ground level.

**Non-submersible (centrifugal) pumps**

General: Provide pumps capable of operating safely in a dry state. Provide priming facilities, foot valve and strainer on the suction line.

**Controls**

General: In addition to the requirements of **Controls for dual pump installations** provide float switches to detect the following and control the pumps:

- Stop duty pump.
- Start duty pump.
- Stop standby pump.
- Start standby pump.
- Overflow (to signal an alarm).



**Pressure gauges**

General: Provide a pressure gauge to indicate the pressure at the outlet of the pump.

**3 EXECUTION****3.1 INSTALLATION****Standards**

Hot and cold water service pumps: Install to AS/NZS 3500.1 Section 11.

Stormwater pumps: Install to AS/NZS 3500.3 Section 9.

**Connections**

General: Arrange pumps, piping and valves so that individual pumps can be removed with minimal drain down and disturbance to the connected piping. Support pipes independently of pumps.

Connections: Install vibration isolating couplings in the connecting pipes at the pumps. Provide couplings selected for a working pressure at least twice the system design pressure.

**Vibration mounts**

General: Provide corrosion-resistant anti-vibration mounts under each pump. Alternatively, if the pumps are installed on a base plate the mounts may be installed under the base plate.

**Pressure tapplings**

General: Provide a pressure tapping on the inlet and discharge of each pump.

**Fixing**

General: Fix all pumps and pump sets to the supporting structure. Use expanding shield anchors for concrete.

**3.2 COMPLETION****Commissioning**

General: Commission to the manufacturers' recommendations.

**3.3 TESTS****Testing**

General: Provide the following tests for each pump and pump set before practical completion:

- Pump operation: Test for correct pump rotation and operation.
- Automatic changeover: Test changeover sequence under all operational combinations.
- Level controls: Operate pumps, measure levels and adjust if necessary.
- Safety controls: Simulate fault for each safety control.
- Alarms: Simulate alarm condition. Verify correct alarm raised.
- Motors: Measure motor current and adjust motor overloads to suit.
- Completion test: Provide a full operational test to verify compliance.

**4 SELECTIONS****4.1 SCHEDULES****Pump schedule**

Properties	Pump designation
	P1
Pump type	Global Pumps pre-packed Sewer Pump Station (TBC)
Liquid being pumped	Waste water
Number of pumps in system	2
Flow (L/s) per pump	2
Duty head at flow rate (kPa)	200

**0822 WASTEWATER****1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide sanitary plumbing and drainage, as documented.

**1.2 CROSS REFERENCES****General**

Requirement: Conform to the following:

- 0171 General requirements.
- 0223 Service trenching.
- 0801 Hydraulic systems.
- 0811 Sanitary fixtures.

**1.3 STANDARDS****Authorised products**

Standard: Listed in the WaterMark Product Database, unless otherwise required by the network utility operator.

**Sanitary plumbing and sanitary drainage**

General: To AS/NZS 3500.2.

Root intrusion into buried pipes: Provide only pipe systems that have passed tests to AS 5055.

**1.4 SUBMISSIONS****Certification**

General: Submit evidence that proposed tapware is listed in the WaterMark Product Database.

**1.5 INSPECTION****Notice**

Inspection: Give sufficient notice so that inspection may be made at the following:

- Excavated surfaces.
- Concealed or underground services.

**2 PRODUCTS****2.1 SANITARY PLUMBING****Location**

General: Verify location and invert level of piping before commencing installation.

Layout: Arrange piping to conform to the documented layouts as follows:

- Avoid interference with other services and building elements not yet installed or built.
- Follow the most direct route with the least number of changes of direction.

Ducts: If installed in ducts, locate and fix stacks, wastes and pipes independently of other services. Arrange so they are easily accessible and removable throughout their entire length.

**Discharge from air handling systems**

Trays, sumps and plumbing: To AS/NZS 3666.1.

**Thermal movement**

General: Arrange piping to accommodate thermal expansion. Provide proprietary expansion joints in copper and plastic pipes where pipe flexibility does not allow for movement. Make sure that movement does not strain branch connections.

**Vent pipes**

Staying to roof: If fixings for stays penetrate the roof covering, seal the penetrations and make watertight.

Terminations: Provide vent cowls of the same material as the vent pipe.

**Wet area floors**

General: Where drainage connections pass through wet area floors, terminate 4 mm below the substrate surface.

**2.2 SANITARY DRAINAGE****Laying**

General: Lay in straight lines between changes in direction or grade with sockets pointing up hill. If other pipes are adjacent, set each pipe true to line and complete each joint before laying the next pipe. If work is not continuous, cap open ends to prevent entry of foreign matter.

**Pipeline identification**

General: Lay detectable plastic warning tape, 300 mm above buried piping, for the full length of the piping.

**2.3 PIPING****Finishes**

General: Finish exposed piping, including fittings and supports, as follows:

- In internal locations such as toilet and kitchen areas: Chrome plate copper piping to AS 1192 service condition 2, bright.
- Externally, and steel piping and iron fittings internally: Paint.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for identification marking. Prime steel piping and iron fittings.

Valves: Finish valves to match connected piping.

**Supports**

General: As documented in the **Pipe support schedule**.

**Pipeline tolerances table**

	Permissible angular deviation from alignment	Permissible displacement from alignment
Horizontal	1:300	15 mm
Vertical	1:500	5 mm

**Trade waste**

General: As documented in the **Sanitary plumbing, Sanitary drainage** and the following:

- Piping: As documented in the **Trade waste piping schedule**.
- Disposal: Provide sumps or interceptors.

**Laboratory wastes**

General: If there are chemically corrosive effluent wastes, provide compatible traps and waste connections, and drain to a treatment pit.

Trap material: As documented in the **Traps schedule**.

**2.4 TESTING****Pre-completion tests**

Requirement: Test to AS/NZS 3500.2 Section 15, before backfilling or concealing.

Leaks: If leaks are found, rectify and re-test.

**2.5 COMPLETION****Cleaning**

General: On completion clean and flush the whole installation.

### 3 SELECTIONS

#### 3.1 WASTEWATER

##### Sanitary plumbing piping schedule

**Material:**

Service

Sewer Pipes UPVC DWV Class

Soil Waste &amp; Vent UPVC DWV Class

Trade Waste (Ground  
Floor Café Provision) Polyethylene (HDPE)
**Jointing:**

Copper Generally Silver brazed

UPVC DWV Class Solvent Welded

Polyethylene (HDPE) Fusion welded

Drainage

Property	A	B	C
Location			
Pipe material	UPVC		
Nominal size	40 -225mm		
Grade or class	DWV		
Jointing method	Solvent welded		

##### Sanitary drainage piping schedule

Property	A	B	C
Location			
Pipe material	UPVC DWV		
Nominal size	40 -225mm		
Grade or class	DWV		
Jointing method	Solvent Welded		

##### Trade waste piping schedule

Property	A	B	C
Pipe material	HDPE	u	
Nominal size	50-160mm	50-100mm	
Grade or class	Drainage	316	
Jointing method	Electro fusion welded	Rubber ring	

##### Floor grate schedule

Property	A	B	C
Location			
Pipe material	HDPE	Brass	Stainless steel
Nominal size	110mm	80- 100mm	100
Grade or class	Chrome plated brass	Chrome plated brass	316
Jointing method	Electro fusion welded	Rubber ring	

Property	A	B	C
Remarks		Screw in brass to suit floor type	Galvin 67717X for tile & 69468X for vinyl

Property	D		
Location			
Pipe material	Stainless steel	UPVC	Stainless steel
Nominal size	100	80- 100mm	100
Grade or class	316	DWV	316
Jointing method		Rubber ring	
Remarks	Galvin 303380X for tile & 303176X for vinyl	Generic	Galvin 67717X for tile & 69468X for vinyl

**Traps schedule**

Property	A	B	C
Type	Chrome plated "P" or "S"	Plastic	Trade waste
Material	Brass	Polypropylene	HDPE
Dimensions (mm)	40-50mm	40-50mm	40-50mm
Location	Exposed	Concealed	Exposed or concealed

**Gullies schedule**

Property	A – Gully Trap	B – Reflux valve	C
Overflow gully	plastic	N/A	
Size (mm)	100 -150mm	100 -150mm	
Cover type	Refer drawings	Refer drawings	
Material	UPVC	UPVC - Aymroo	

**Inspection opening schedule**

Property	A - External	B - Internal	C - Internal
Size (mm)	100-150mm	100- 150mm	100-150mm
Cover type	Cast iron	Non slip chrome plated brass	316 stainless steel
Remarks	Trafficable HD or LD. Cooke Precast Concrete	Generic	Galvin 67717X for tile & 69468X for vinyl

**Grease arrestor schedule**

Property	A - concrete	B – stainless steel	C polyethylene
Location	Basement		
From	Ri Industries		
Material	Concrete with Cast Iron Trafficable Air tight lids		
Capacity (L)	1,000L		

**Fixtures:**

Basins/Vanity (fully concealed)

Basins/Vanity (exposed)

Basins/Vanity (exposed)

Sinks (concealed)

Sinks (exposed)

Sinks Commercial Kitchens

Floor Waste Gully (FWG)

Floor Waste Gully (FWG) in Vinyl Floored

Floor Waste Gully (FWG)

Floor Waste Gully (FWG) in Vinyl Floored

Kitchen Floor Drain in Vinyl Floored

Kitchen Floor Drain

Kitchen Floor Silt Trap

**Trap and Waste:**

Polypropylene "P" Trap with waste built into wall.

Chrome Plated Copper "P" Trap with waste built into wall

Chrome Plated Copper "S" Trap.

Polypropylene.

Chrome Plated Copper "S" Trap

Fully Chrome Plated Copper

Screw-in chrome plated brass grate.

"Betafit" vinyl grate with chrome plated brass inserts.

Screw-in chrome plated brass grate.

Galvin # 303176X - Stainless Steel 316 Exl Floor Drain Grate Assembly Vinyl 100X80 PVC Slip-In.

Galvin # 303176X - Stainless Steel 316 Exl Floor Drain Grate Assembly Vinyl 100X80 PVC Slip-In.

Galvin # 302380X - Stainless Steel 316 Exl Floor Drain Grate Assembly Round 100X80 PVC Slip-In.

Blucher – stainless steel silt trap with silt basket, fixed 2mm mesh secondary filter and Wedge Stainless Steel Grate. Silt Trap to suit vinyl floor. Refer to drawings for location and inlet dimensions to silt trap.

Inspection

Opening (I.O.)

**External:**

Paved Areas:

Everlevel type 1 cast I.O. marked "SEWER" with concrete support block or equal approved

Concrete Path:

Everlevel type 1 cast I.O. marked "SEWER" with concrete support block or equal approved

Concrete Path:

150 dial PVC bolted trap screw with brass non slip lid

Unpaved Area:

Everlevel type 2 cast I.O. marked "SEWER" with precast concrete surround or equal approved

**Internal:**

General:

Galvin # 67717X - Stainless Steel 316 Exl Slip-Safe Bolted Cleanout Round 150X100 PVC/HDPE/CU Slip-In.

Vinyl Floors:

Galvin # 69468X - Stainless Steel 316 Exl Slip-Safe Bolted Cleanout Vinyl 150X100 PVC/HDPE/CU Slip-In.

Inwall Tundish

Modtec stainless steel inwall tundish.

## 0823 COLD AND HEATED WATER

**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide cold water and heated water systems, as documented.

**1.2 CROSS REFERENCES****General**

Requirement: Conform to the following:

- 0171 General requirements.
- 0801 Hydraulic systems.

**1.3 STANDARDS****General**

Water supply: To AS/NZS 3500.1.

Heated water supply: To AS/NZS 3500.4.

Backflow prevention: To AS/NZS 2845.1 and AS 2845.2.

Copper pipe: To AS 1432 and AS 4809.

Microbial control: To AS/NZS 3666.1 and AS/NZS 3666.2 and the recommendations of SAA/SNZ HB 32.

**Authorised products**

Standard: Listed in the WaterMark Product Database, unless otherwise required by the network utility operator.

**Installation of glass wool and rock wool insulation**

General: Conform to the

ICANZ Industry code of practice for the safe use of glass wool and rock wool insulation *Industry code of practice for safe use of glass wool and rock wool insulation*.

Marking: Deliver mineral wool products to site in packaging labelled FBS1 BIO-SOLUBLE INSULATION.

**Labelling**

Water efficiency labelling: Provide only products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS).

**1.4 INTERPRETATION****Definitions**

General: For the purposes of this worksection the following definitions apply:

- FBS-1 (fibre-bio-soluble) mineral wool: Insulation composed of bio-soluble glass or rock fibres.
- Heated water: Water that has been intentionally heated. It includes hot water and warm water.
- Material r-value: The thermal resistance ( $\text{m}^2\cdot\text{K}/\text{W}$ ) of a component calculated in conformance with AS/NZS 4859.1 clause 2.3.3.8. Material R-Value does not include air space or surface resistances.

**Certification**

WaterMark certification: Submit evidence that proposed components are listed in the WaterMark Product Database.

**Fire hazard properties**

General: Submit evidence of conformance with PRODUCTS, MATERIALS, Fire hazard properties.

**Products and materials**

Thermal insulation performance: Submit evidence of conformance to AS/NZS 4859.1.

**Samples**

General: Submit samples of accessories identified by proprietary item, including the following:

- Valves.
- Instruments, including gauges and thermostats.

## 1.6 INSPECTION

### Notice

Inspection: Give notice so that inspection may be made of the following:

- Excavated surfaces.
- Concealed or underground services.

## 2 PRODUCTS ---

### 2.1 COMPONENTS

#### Pressure control valves

General: Provide reduction valves, pressure limiting valves, or ratio valves, which produce the necessary reduction in pressure.

#### Backflow prevention devices

General: As documented in the **Testable backflow prevention devices schedule**.

Standard: To AS/NZS 2845.1 and AS 2845.2.

#### Line strainers

Type: Low resistance, Y-form bronze bodied type, with screen of dezincification resistant brass, corrosion-resistant stainless steel, or monel.

Screen perforations: 0.8 mm maximum.

### 2.2 MATERIALS

#### Fire hazard properties

Spread-of-Flame Index: Maximum 9 tested to AS/NZS 1530.3.

Smoke-Developed Index: Maximum 8 if Spread-of-Flame is over 5, tested to AS/NZS 1530.3.

Flammability Index of facing materials: Maximum 5 tested to AS 1530.2.

Materials with reflective foil facing: Test to AS/NZS 1530.3 clause A6.

Combustibility of insulation materials and facing: Not deemed combustible as determined by AS 1530.1.

### 2.3 INSULATION MATERIALS

#### General

Standard: To AS/NZS 4859.1.

Material R-Value of insulation:  $\geq$  Total R-Value in AS/NZS 3500.4 for the type and location of the pipe.

#### Polyolefin foam

Type: Closed cell cross-linked polyolefin foam produced using a hydrocarbon blowing agent.

Insulation surface facing: Heat-bonded aluminium foil laminate.

#### Glass wool and rock wool and polyester

Description: Select from the following:

- Glass wool or rock wool resin-bonded to form tubular sections.
- Polyester in moulded tubular sections.

#### Elastomeric foam insulation

Type: Chemically blown closed cell nitrile rubber in tubular sections for pipe insulation, in sheets for insulating pipe fittings, and in sheets or rolls for large pipes, tanks, vessels and heat exchangers. Provide with smooth natural finish and vapour barrier properties.

Physical properties:

- Free of ozone depleting gases in manufacture and composition.
- Moisture absorption: Non-hygroscopic.
- Water vapour permeability: Maximum 0.065 ng/Pa.m.s.

#### Aluminium foil laminate sheet

Standard: To AS/NZS 4200.1.



Material: Glass fibre reinforced, aluminium foil-paper laminate.

Duty classification to AS/NZS 4200.1: Heavy duty.

#### **Adhesives and sealants**

Requirement: Provide adhesives and sealants to manufacturer's recommendations.

#### **Aluminium foil laminate tape**

Adhesive: Non-toxic, high tack synthetic pressure sensitive type.

Liner: Silicone coated paper.

Backing: Aluminium foil laminate.

Minimum width: 50 mm.

Minimum mechanical properties: Polyethylene tape serial number F11 to AS 1599.

### **3 EXECUTION**

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#### **3.1 PIPING**

##### **Location**

Mains connection: Connect the cold water supply system to the network utility operator's main through a stop valve and meter.

Cold water system: Provide the cold water supply system, installed from the meter to the draw-off points or connections to other services as documented in the **Piping system schedule**.

Heated water system: Provide the heated water system, installed from the cold water connection points to the draw-off points or connections to other services as documented in the **Piping system schedule**.

##### **Finishes**

General: Finish exposed piping, including fittings, cover plates and supports, as follows:

- Chrome plate copper piping to AS 1192 service condition 2, bright in internal locations such as toilet and kitchen areas:
- Paint external above ground piping, and internal steel piping and iron fittings exposed to view.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for identification marking. Prime steel piping and iron fittings.
- Valves: Finish valves to match connected piping.

##### **Fittings and accessories**

General: Provide the fittings required for the proper functioning of the water supply system, including taps, valves, backflow prevention devices, pressure and temperature control devices, strainers, gauges and automatic controls and alarms.

Provision for dismantling: Arrange piping by the provision of unions or similar so that valves, taps and other maintainable components can be removed for maintenance without disturbing or cutting adjacent piping.

##### **Material identification marks**

General: Pipes with grade or class identification markings: Install so that the markings are visible for inspection.

##### **Pipes under pressure embedded in concrete**

General: Use only copper pipe and the minimum number of joints. Pressure test and rectify leaks before the concrete is poured.

##### **Valve spindles**

General: If practicable, install valve spindles in a vertical position.

#### **3.2 PIPING INSULATION**

##### **General**

Requirement: Insulate all non-chrome plated heated water piping, fittings and valves.

Application: Fit insulation tightly to piping surfaces without gaps. Close butt ends of insulation sections. Minimise number of joints. If the insulation is in half-sections, make only half-circumferential joints at any one place. Seal longitudinal seams in foil laminate and fix insulation at maximum 500 mm centres with polypropylene, zinc-coated steel or aluminium straps.

Unions and other items requiring service: Install the insulation so that it is readily removable.

Fittings: Provide insulation with thermal resistance at least equal to that of the adjacent piping insulation.

### **Insulation material**

General: Provide insulation material as documented.

### **Elastomeric foam insulation**

Adhesives: Adhesive fix all longitudinal and butt joints. Adhere to the pipe at end joints, for a distance of 25 mm, to compartmentalise each section. Use only solvent-based adhesive supplied by insulation manufacturer and designed specifically for the material being used.

### **Sheathing**

General: Provide metal sheathing to all piping insulation:

- In plant rooms.
- Where exposed to weather.
- Where exposed to view.
- Where subject to mechanical damage.
- On valves, pipeline components and pumps in sheathed piping.

Metal sheathing: Cover piping with 0.5 mm thick metallic-coated steel sheet sheathing sprung over the insulation in one piece with laps at least 30 mm wide, and fastened with self-tapping screws or snap head rivets at 150 mm maximum centres. Preform the sheathing to match the shape of the insulated pipe and fittings. Position laps to avoid water penetration. In external locations weatherproof the joints and fixings using non-setting mastic.

Alternative protection for elastomeric foam: Where exposed to sunlight but not exposed to mechanical damage, provide 2 coats of tintable, water-based, rubberised, UV resistant, flexible paint finish to outdoor installations.

### **Surface preparation**

General: Clean the surfaces to remove scale, rust, grease and dirt and prepare surfaces to suit the insulation. Restore surface coatings, which have been damaged or affected by welding.

### **Insulation at pipe supports**

General: Provide supports formed to fit around the insulation.

Pipes under DN 25: Either:

- Fit supports directly to pipe and form insulation around the support.
- Support as for pipes DN 25 or over.

Pipes DN 25 or over: Either:

- Protect the insulation at the support point with metal sheathing extending sufficient distance both sides of the support so the insulation thickness is reduced by less than 10%.
- Replace the insulation at the support point with a shaped timber or cork spacer block. Butt the insulation up to the spacer block and seal with silicone compound. Clad the block and insulation in 0.5 mm metallic-coated steel sheet extending 100 mm both sides of the support.

### **Insulation of buried pipes**

Insulation material: Elastomeric foam certified by the manufacturer as suitable for use direct buried in-ground.

Sealing: Seal all butt joints and longitudinal joints and seams with the insulation manufacturer's recommended adhesive. Seal the insulation to the pipe at both ends and each termination.

Valves and fittings: Insulate and seal as for pipe. Install valves in pits.

Protection: Protect the pipe from water penetration. Select from:

- Use of insulation material with integral polymeric coating to protect from mechanical damage, water penetration and the growth of bacteria, mould and mildew.
- Application of high density rubber sheathing supplied by the insulation manufacturer and certified for use underground.

Sleeving: Install the insulated pipe in a PVC-U soil pipe. If the water table may be above the sleeve pipe, seal all joints watertight. If the water table is permanently below the sleeve pipe, provide 10 mm drain holes at 600 mm centres along the bottom centre of the sleeve pipe.

**Insulation of piping to solar water heating systems**

Standard: AS/NZS 2712.

Insulation material: Insulate flow and return piping between solar collectors and storage vessels as follows:

- Material temperature rating: Minimum 150°C.
- Protection: Protected against ultraviolet light mechanical damage, water penetration and the growth of bacteria, mould and mildew.

Sealing: Seal all but joints and longitudinal joints and seams with the insulation manufacturer's recommended adhesive. Seal the insulation to the pipe at both ends and each termination.

**3.3 PITS****General**

Requirement: Install below-ground water meters, stop valves and control valves in concrete access pits with removable pit covers.

**Construction**

Internal dimensions: To give 300 mm clear space all around the fittings in the pit.

Concrete: Grade N20 to AS 1379, 100 mm thick, reinforced with F82 fabric.

Pit covers: To AS 3996.

**Installation**

General: Grade floor to a point on one side and drain to the stormwater drainage system. Carry the pit walls up to 50 mm above finished ground level. Cast in the pit cover frame flush with the top. Trowel the top smooth.

**3.4 MARKING****Notice plate**

General: Provide a notice plate containing condensed emergency instructions, legibly printed or engraved on durable material resistant to defacement, at least 3 mm thick or mounted on board at least 3 mm thick, permanently fixed in a convenient position at the control valves.

**3.5 VALVE BOXES****General**

Requirement: Provide cast iron valve boxes with removable covers for access to underground gate valves. Provide cast iron sluice valve covers for access to sluice valves.

**Installation**

General: Set beneath each box a shaft formed of PVC-U pipe to give clear access to the valve wheel or spindle. Set top flush with pavement surface, or 15 mm above unpaved surfaces, and encase in formed concrete box 150 mm thick, with top surface trowelled smooth.

**3.6 TESTING****Pre-completion tests**

Pressure tests: Before insulation is applied to joints pressure test piping to AS/NZS 3500.1 and AS/NZS 3500.4 as appropriate.

Leaks: If found, rectify and re-test.

Cross connections: Isolate systems individually and check for cross connections.

Backflow prevention: To AS/NZS 3500.1.

Tapware: Check for leaks.

**Completion test**

General: Provide a full operational test to verify conformance.

**3.7 COMPLETION****Commissioning**

Strainers: Remove, clean and replace strainer baskets.

Cleaning: To AS/NZS 3500.1 Appendix I.

Disinfection: Disinfect to AS/NZS 3500.1 Appendix J.

Cold water systems: Test and commission to AS/NZS 3500.1 Section 18.

Heated water systems: Test and commission to AS/NZS 3500.4 Section 9.

Testable backflow prevention devices: Test and commission to AS 2845.3 by a licensed plumber with backflow device accreditation. Tag and certify to the requirements of the network utility operator.

### Charging

Completion: On completion of installation, commissioning, testing and disinfection, fill the system with water, turn on control and isolating valves and the energy supply and leave the water supply system in full operational condition.

### Maintenance manuals

Standard: To AS/NZS 3666.2.

## 3.8 MAINTENANCE

### General

Requirement: Conform to the 0891 *Hydraulic maintenance* worksection.

## 4 SELECTIONS

### 4.1 COLD AND HEATED WATER

#### Piping system schedule

#### Material:

##### Service

Mains Water (Underground)	Copper Type B (protective wrap underground pipework) or Polyethylene Pressure Pipe
Mains Water (Above ground concealed)	Copper Type B or Pressure Class Cross Linked High Density Polyethylene
Mains Water (concealed) in Building	Copper or Pressure Class Cross Linked High Density Polyethylene
Mains Water (exposed)	Copper Type B (Chrome Plated)
Hot Water (Concealed)	Copper Type B (Fully Insulated) or Pressure Class Cross Linked High Density Polyethylene (Fully Insulate)
Hot Water (concealed) in Building	Copper (Fully Insulated) or Pressure Class Cross Linked High Density Polyethylene (Fully Insulate)
Hot Water (Exposed Inside)	Copper Type B (Chrome Plated)
Hot Water (Exposed Outside)	Copper Type B (Fully Insulate with Insulation Metal Sheathed)
Fire Hose Reel external	Copper Type B, Denso wrapped or Kemlagged coated
Fire Hose Reel	Copper Type B

#### Jointing:

Copper	Generally	Silver brazed
	Taps	Compression fittings
	Valves	Screwed
UPVC	Pressure	Solvent Welded
Pressure Class Polyethylene	Fusion welded	
Pressure Class Polypropylene	Refer to Manufacturer	

Property	A	B	C
Cold water: Material	Copper	HDPE	Crosslinked Polyethylene (Rehau)
Location	In ground external & internal to buildings	External underground	Internal to building
Cold water: Nominal size	15-100mm	20-100mm	16-63mm
Cold water: Jointing method	Silver soldered	Mechanical or Electrofusion	Refer manufacturer
Heated water: Material	Copper	HDPE	Crosslinked Polyethylene (Rehau)
Location	Internal to the building	N/A	Internal to building
Heated water: Nominal size	15-100mm		16-63mm
Heated water: Jointing method	Silver soldered	Mechanical or Electrofusion	Refer manufacturer
Heated water: Insulation material	25mm closed cell on main lines & flow & return lines. 13mm closed cell on warm and hot lines	25mm closed cell on main lines & flow & return lines. 13mm closed cell on warm and hot lines	25mm closed cell on main lines & flow & return lines. 13mm closed cell on warm and hot lines

**Isolating valves schedule**

Service	Make	Material	Connections
<u>Mains Water</u>			
Isolation up to 50dia	Rye or similar DR brass ball valve	Brass	Screwed
Non Return (check) up to 50 dia.	John Fig. 4B	Bronze	Screwed
Pressure Reduction up to 50 dia	Wilkins Adjustable Model NR3 set to 500 kpa	Brass	Screwed
Pressure Reduction Valve above 50 dia.	Wilkins Adjustable Model 50-600 HLR set to 500 kpa	Brass	Screwed or Flanged
<u>Gas</u>			
Isolation	Ball Valve	Bronze	Screwed

**Testable backflow prevention devices schedule**

Property	A	B	C
Cross-connection hazard rating	Medium		
Description	<b>Testable Double Check Valve (TDCV)</b> Proprietary Item: "ValvCheQ" or equal approved incorporating downstream and upstream isolating valves and strainer.		

**Caution Sign**

All potable water is to be teed off before the backflow prevention device and all other taps shall be clearly and permanently labeled "CAUTION NOT FOR DRINKING" at every outlet. The caution sign shall comply with AS 1319 and the distribution pipes shall be clearly marked in accordance with AS 1345.

**Testable Double Check Valve (DCV)**

Proprietary Item: "ValvCheQ" or equal approved incorporating downstream and upstream isolating valves and strainer.

**Hose Connection Vacuum Breaker (HCVB)**

Proprietary Item: "Combraco" or equal approved.

Installation: Install on end of outlet prior to hose connector. Install for permanent installation by turning set screw until head breaks off. Use brass bodies except where tap is chrome plated then use chrome plated type.

**Insulation**

Requirement: Insulate pipes as follows:-

- Hot water pipework
  - . Fully insulate (including final pipework to fixtures) - Flexible pipe insulation
- Cold water pipework for noise control
  - . Flexible pipe insulation (Where shown on drawings and specified)
- 6mm thick Polyethylene between all brackets and pipework.

**Labelling**

Pipework	<ul style="list-style-type: none"> <li>. Soil waste and vents: SA Water Corporation requirements and AS 3500.</li> <li>. Hot and cold water: Identification lettering and direction arrows.</li> </ul>
Domestic Hot Water	. Red lettering on white "HW" (with direction arrow)
Domestic Cold Water	. Green lettering on white "CW" (with direction arrow)
Domestic Warm Water	. Red lettering on white. "WW" (with direction arrow)
Labelling	. Valves, equipment, gauges, instruments and similar items
Equipment	. Protection from corrosion or weathering
Equipment Exposed	. Fully paint (colour to be nominated)

**0891 HYDRAULIC MAINTENANCE****1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Maintain the hydraulic systems for the documented maintenance period so that the performance, reliability, service life, energy efficiency and safety of the system is equal to or better than that at the beginning of the maintenance period, in parallel with and including:

- Periodic and statutory maintenance, cleaning and replacement of consumables.
- Emergency repairs.
- Condition reporting.

Maintenance period: As documented.

**1.2 CROSS REFERENCES****General**

Requirement: Conform to the following:

- *0171 General requirements.*

**1.3 INTERPRETATION****Definitions**

General: For the purpose of this worksection the following definition applies:

- Consumable: Materials or components intended to be replaced within the service life of the associated plant or equipment.
- Periodic maintenance: Planned routine maintenance of plant and equipment (proactive), including fire safety measures and statutory requirements.
- Repairs: Unplanned/corrective maintenance (reactive).
- Replace/replacement: Replacement of components on a regular cycle on a like for like basis, e.g. repainting, replacement of air conditioning plant.

**1.4 SUBMISSIONS****Certification**

Annual certification: Inspect and submit certification for all items required to be inspected annually under statutory requirements including, but not limited to, air handling systems required for fire operation, boilers and pressure vessels.

**Records**

Maintenance records: Conform to the *0171 General requirements* worksection.

Periodic maintenance and performance report: At the frequency documented, submit reports summarising the maintenance performed and the performance of the hydraulic installation in the preceding period. Set out the report in a form that permits comparison with previous reports. Include the following as minimum requirements:

- Dates and number of site labour hours for periodic maintenance. Exclude travelling time.
- Dates, number of site labour hours and nature of work for emergency repairs. Exclude travelling time.
- Dates and number of site labour hours for defects liability rectification if within the defects liability period. Exclude travelling time.
- List of any motors for which the motor current varied by more than 10% from the current measured during commissioning.
- For each separately metered item, the water or gas use for each month of the reporting period.

## 1.5 INSPECTION

### Notice

Requirement: Give notice so that an inspection may be held simultaneously with the final programmed maintenance visit.

## 2 PRODUCTS ---

### 2.1 GENERAL

#### Product selection

Proprietary items: Select products, as consumables or replacement items, of the same make, model and type as those being replaced.

Substitutions: Where the existing product is no longer available, provide products with at least the same performance and construction characteristics.

## 3 EXECUTION ---

### 3.1 EMERGENCY REPAIRS

#### General

Requirement: Respond to call outs for breakdowns or other faults requiring emergency repairs. Rectify faults and replace faulty materials and equipment.

Remedial work: Carry out any remedial work, including temporary work, necessary to restore each system to safe and satisfactory operation. Verify each system is operating correctly before leaving the site. Do not leave the plant in an unsafe condition.

Temporary work: Promptly replace temporary work with permanent rectification.

#### Contact details

Emergency contract: Provide contact details including after hours and emergency mobile and/or pager details, to permit notification of emergency conditions.

#### Response time

Period: Attend site for emergency service within the documented response time.

Response period: Starts at the time of notification to the contractor's nominated contact point.

### 3.2 PERIODIC MAINTENANCE

#### General

Microbial control maintenance: To AS/NZS 3666.2.

Routine visits: Make routine service visits at the frequency documented. Service items of equipment in conformance with the maintenance schedules in the operation and maintenance manuals.

Notification of defects: When defects in the installation are identified, give notice.

Requirement: Provide maintenance work including, but not limited to, the following:

- Carry out the manufacturers' recommended maintenance.
- Attend to reported defects and complaints.
- Check for and repair corrosion.
- Check for and rectify any unsafe conditions.
- Replace faulty or damaged parts and consumable components.
- Check anti-vibration supports, brackets and clamps, holding down bolts and flexible connections, for deterioration and for freedom of movement of assembly.
- Identification of pipes, conduits and ducts maintenance: To AS 1345.
- Safety signs maintenance: To AS 1319.

#### Cleaning

Requirement: At the end of the maintenance period:

- Remove waste and clean all parts of the installation.
- Remove temporary protective coatings, packaging and labels.
- Clean screens and strainer baskets.



**Piped systems**

Tasks: Perform the following:

- Check equipment items and record values for operation, calibration, performance compliance, temperature and energy consumption.
- Rectify all water leaks regardless of size. Clean and repair any water damage.
- Check condition of insulation and repair as required.
- Provide service tags recording inspections and tests.

**Cold and heated water**

Maintenance of tanks and piping for potable water: To AS/NZS 3500.1 and AS/NZS 3500.4.

Ball float valves: Check and adjust for no overflow.

Heated water systems:

- Conform to the recommendations of AS/NZS 3500.4 Appendix N.
- Inspection and maintenance: To AS/NZS 3666.2.
- Provide service tags recording inspections and tests.

Leaks: Inspect cold and heated water systems at least annually for the following:

- Leaks, including leaks from cisterns.
- Other defects.
- Safe condition.
- Conformance to the PCA and network utility operator requirements.

Leaks and defects: Report if found and rectify.

Strainers: Inspect and clean at least annually.

**Tapware**

Requirement: Inspect for leaks and damage. If leaks are found, service O-rings, replace washers and reseal to rectify.

**Hydraulic pumps**

Pumps and pump seals: Check and rectify if defective.

**Backflow prevention**

General: Maintain to AS 2845.3 and AS/NZS 3500.1.

Service tags: Record inspections and tests.

**Thermostatic mixing valves**

Field testing and maintenance: To AS 4032.3.

Service tags: Record inspections and tests.

**Boiling, chilled and filtered water dispensers**

Service: Maintain to manufacturer's recommendations. Provide all consumables including, but not limited to, replacement filter cartridges.

Service tags: Record inspections and tests.

**Fuel gas**

Requirement: Maintain fuel gas services so that they are:

- Free from leaks and other defects.
- Efficient and safe.
- In conformance with AS/NZS 5601.1 and network utility operator requirements.

Maintenance: Perform the following annually:

- Inspect all gas reticulation including fixings, isolating valves, regulators and safety enclosures.
- Pressure test the whole installation for leaks.
- Provide service tags recording inspections and tests.

**Gas appliances**

Service: Conform to AS 3814, including the recommendations of Appendix G. Inspect each appliance for correct operation including flame fail safe valve, thermocouple, thermostat and burners.

**Sanitary plumbing**

Requirement: Maintain as follows:

- At least annually: Inspect for leaks, repair and report.
- At other times: Attend and clear blockages within 24 hours of notification. Submit a report on the cause of the blockage.

System performance: Conform to the PCA and network utility operator requirements.

**Trade waste**

Requirement: Annually inspect and clean odour vent filters.

**Hydrants and hose reels**

Hydrants: To AS 1851.

Hose reels: To AS 1851.

Pumpset systems: To AS 1851.

**Sprinklers**

Standard: To AS 1851.

Maintenance: Provide regular maintenance to AS 1851. Carry out yearly routine service during the end of the maintenance period service.

Records: Submit log books.

**Water conservation**

Requirement: Conform to SAA HB 233.

**Automatic controls**

Requirement: Perform the following:

- Check operation and safety controls for variable speed drives. Check and record output frequency. Adjust if incorrect. Rectify defects.
- Record readings of thermometers, gauges, meters, current draw of motors and heaters, sample readings, control set points and controlled space conditions.
- Check sensor calibration. Recalibrate if incorrect.
- Check electrical and control systems, including safety limits for temperature, pressure and humidity. Adjust if incorrect. Rectify defects.
- Provide service tags recording inspections and tests.

**Electrical systems**

Requirement: Perform the following:

- Check for hot joints, burnt insulation, burn contacts and repair.
- Check electrical connections for tightness. Tighten loose connections.
- Check operation of all electrical components. Rectify defects.
- Check indicating lights and replace defective lamps.
- Check and record motor currents.
- Check overload settings. Adjust if necessary.
- Check and report any changes to controls and wiring.
- Provide service tags recording inspections and tests.

Standards:

- Electrical equipment generally: To AS/NZS 3760.
- Switchboards: To AS 2467.
- Repair and overhaul of rotating electrical equipment: To AS 4307.1.

**3.3 END OF MAINTENANCE PERIOD SERVICE****General**

Requirement: Within a month of the end of the maintenance period, undertake all work scheduled to be carried out on an annual basis.

**3.4 COMPLETION****Maintenance records**

Service records: Record maintenance undertaken in the schedules in the operation and maintenance manuals.

Maintenance reports: Prepare maintenance reports as documented.

**Restitution after maintenance tasks**

Requirement: Restore removed, damaged, contaminated or soiled services and building elements when the maintenance task is complete.

Standard: Equal to the condition of the original installation.

**4 SELECTIONS****4.1 MAINTENANCE****Maintenance requirements schedule**

Provision	Requirement
Maintenance period	Conform to the 0171 <i>General requirements</i> worksection
Call out response time not to exceed	
Maximum time between programmed service visits	
Frequency of periodic maintenance and performance reports	