SAMOA WATER AUTHORITY

ENGINEERING STANDARDS

(Water)

PART 3

MATERIALS AND PRODUCTS STANDARDS

July 2014

Engineering Standards (Water)

Part 3: Materials and Product Standards Issue:July 2014

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1 SCOPE

Part 3, "Materials and Products Standards" describes the standard quality and design of the items most commonly used on SWA water infrastructure.

All materials used on water supply projects that are intended for management by SWA shall meet the criteria documented in Part 3. Alternative materials will only be considered if they can be proved to be of an equal or higher standard. Approval for alternative products must be obtained in writing from the SWA Manager, Technical Division.

Part 3 shall be read in close association with the Standard Specification for Water Supply (SSWS).

2 STANDARD MATERIALS AND PRODUCTS

2.1 General

2.1.1 Standards

The sections below document materials and products that are approved for use on SWA managed water supply systems. Where a product standard is nominated (eg AS or NZS) the latest version of that standard, including amendments is implied.

2.1.2 Quality Assurance and Manufacturing Licencing Certification

All manufacturers must be certified according to **ISO9001 Quality Assurance Standard**. All materials and equipment must be manufactured under a recognised product certification scheme and each item supplied must be marked in accordance with the certification body's requirements including the product standard and manufacturing licence details. Any materials or equipment supplied not properly marked will be rejected.

2.1.3 Materials in contact with drinking water

All materials and equipment for use in the water supply system shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

2.1.4 Copper Alloys - General

All copper alloy fittings shall be LG2 Gunmetal Brass to **AS1565 Copper and copper alloys- ingots and castings**, and shall clearly bear the mark DR to signify Dezincification Resistance properties to **AS 2345 Dezincification of copper alloys**.

2.1.5 Flanges - General

Unless otherwise stipulated, all flanged fittings shall be manufactured to **AS4087 Metallic flanges for waterworks purposes** as follows.

- PN16 Figure B5
- PN35 Figure B6.

2.1.6 Elastomeric Seals - General

Unless otherwise stipulated, all elastomeric seals shall be manufactured to **AS1646 Elastomeric seals for waterworks purposes**

2.1.7 Polymeric Coatings - General

Unless otherwise stipulated, all Polymeric Coatings shall be manufactured to **AS/NZS4158 Thermal-bonded polymeric coatings on valves and fittings for water industry purposes.**

2.1.8 Flange Gaskets and Stainless Steel Nuts and Bolts

Flange gaskets shall be the inside bolt circle typecomplying with Appendix D3 of **AS4087 Flanges for waterworks purposes** and shall be dual hardness EPDM rubber, 3mm thick, complying with **AS1646 Elastomeric seals for waterworks purposes.**

All nuts, bolts and washers shallbe 316 stainless steel grade 50 to **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products** for bolts and nuts and **AS1449 Wrought alloy steels – stainless and heat resisting steel plate, sheet and strip** for washers, with an anti-seizing paste used in assembly.

All stainless steel nuts and bolts, other than bolts that form an integral part of anarticle, shall comply with the metric standards **AS/NZS1111 ISO metric hexagon commercial bolts and screws** and **AS/NZS1112 ISO metric hexagon nuts**.

Bolt length shall be equal to the sum of the thickness of the flanges, gaskets, nut andwasher and rounded up to the nearest standard size.

Bolts shall exhibit a clean-cut thread with no burrs or torn peaks on the thread. Nutsmust turn freely on the threads without binding.

2.1.9 PVC Pipe Glue, Primer and Lubricant

PVC pipe glue and primer shall comply with **AS/NZS 3879 Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS pipes and fittings**. Glues, primers and lubricants shall be supplied with a minimum remaining shelf life of two (2) years.

PVC pipe glue shall be either Type P for pressure pipe applications or, Type N for low-pressure pipe applications as specified on the schedules.

Jointing lubricants shall be: certified for use in a potable water system; adherent to wet or dry pipe; organic or silicone based; antibacterial; and, not hazardous to handle by hand. Petroleum based greases or lubricants are not permitted.

Other products may be used upon approval by the Manager, Technical Division.

2.1.10 Concrete Structures - General

Unless otherwise stipulated, all concrete structures shall be constructed in accordance with **AS3600 Concrete Structures.**

2.1.11 Customer Property Plumbing - General

SWA customers shall install plumbing in accordance with the latest of edition of the Samoa **National Building Code**. Where the National Building Code does not provide adequate guidance, reference shall be made to the Australian standard **AS/NZS3500 National Plumbing and Drainage Code.**

2.2 Modified PVC Pipes (mPVC) and Fittings

mPVC (PVC-M) Series 1 pipe shall conform to **AS/NZS4765 Modified PVC (PVC-M) pipes for pressure applications**. Unless otherwise approved, the following specifications shall apply:

- Pressure Class PN15 (Minimum)
- Pipe diameters DN100 and above only
- Colour white
- Spigot and socket joints with Z-type rubber ring joints (RJJ) only -solvent jointing cannot be used.
- RRJs shall be manufactured from dual hardness EPDM rubber complying with **AS1646 Elastomeric seals for waterworks purposes**.
- All pipe and jointing materials shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

mPVCpipe of diameter less than DN50 may be approved by the Engineer for some limited applications using solvent welded joints.

mPVC pipe and fittings shall be used only where minimum cover requirements can be practically achieved. mPVC pipe is not approved for above ground use or where minimum pipe cover cannot be achieved due to rock or proximity of other utility service conduits.

2.3 Polyethylene Pipes (PE) and Fittings

Polyethylene pipe shall conform to **AS/NZS4130 Polyethylene (PE) pipes for pressure applications.** Polyethylene fittings shall confirm to **AS/NZS4129 Fittings for Polyethylene (PE) pipes for pressure applications.**

Unless otherwise approved, the following specifications shall also apply;

- Compound PE 100
- Pressure rating PN 16
- Standard Dimension Ratio (SDR) 11 PE 100
- Size DN 110 mm and below
- All pipe and jointing materials shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

Jointing of PE pipes shall be by one of the following methods as shown on the drawings:

- Electrofusion welding
- Mechanical compression joint fittings
- Butt fusion welding

Electrofusion welding shall generally be the preferred jointing method on pipe sizes up to DN 110. Mechanical jointing shall not be used for pipes under paved roads, driveways or footpaths or behind retaining walls.

Note: Nominal Diameter (DN) refers to the outside diameter of the pipe.

2.4 Ductile Iron Pipe and Fittings

Ductile Iron Concrete Lined (DICL) pipe shall conform to **AS/NZS2280 Ductile iron pressure pipes and fittings**. Unless otherwise approved, the following specifications shall also apply:

- Minimum Pressure Rating PN35
- Socket-spigot joints with rubber ring joints (RRJ) or flange-flange joints
- Sockets and RRJs shall be suitable for connection to Series 1 mPVC (PVC-M) pipes
- RRJs shall be manufactured from dual hardness EPDM rubber complying with **AS1646 Elastomeric seals for waterworks purposes**.
- Flanged joints to **AS4087 Metallic flanges for waterworks purposes**, Class PN35, Figure B5
- Ductile iron pipe and fittings shall be protected by a thermal bonded polymeric coating in accordance with **AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes.**
- Pipe and fittings to be internally concrete lined in accordance with **AS/NZS2280 Ductile iron pipes and fittings**.
- All pipe and jointing materials shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

2.5 Galvanised Steel Pipe and Fittings

Galvanised steel pipe and fittings shall conform to **NZS/BS1387 Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads.**

Galvanised steel pipe shall not be used unless specifically scheduled for special sections of work such as water meter assemblies and above ground manifold pipe-work around reservoirs, bore casings and bore columns. For other special cases, Galvanised steel pipe may be used upon approval by the Manager, Technical Division.

2.6 Sluice/Gate Valves DN80 and above

For valves DN80 and above, Sluice valves shall be used. Sluice valves shall comply with **AS2638 Sluice Valves for Waterworks Purpose.** Gate valves may be used upon approval from the Manager, Technical Division. Unless otherwise approved, the following specifications shall also apply:

- Body and bonnet: Ductile iron to **AS1831 Ductile cast iron** with a straight through full bore.
- Stem: Stainless Steel Grade 431

- Stem sealing and bonnet gasket: NBR and EPDM respectively complying with **AS1646 Elastomeric seals for waterworks purposes**.
- Stem seals shall be fully exchangeable under pressure.
- Other concealed metal parts: Dezincification resistant brass complying with **AS1565 Copper and copper alloys- ingots and castings**, dezincification resistant to **AS2345 Dezincification of copper alloys.**
- Internal and external surfaces shall be coated with a polymeric coating in accordance with **AS/NZS 4185 Thermal bonded polymeric coating on valves and fittings for water industry purposes.**
- Valves shall be CLOCKWISE CLOSING.
- Valves shall be either inside screw, non-rising spindle or outside screw, rising spindle as specified in the schedules.
- Valves shall be either key or hand wheel operated as specified on the schedules. The key cap and hand wheel shall be painted blue. Hand wheels shall be marked with the direction of closing.
- Valves shall have flanges, sockets or spigots as specified on the drawings or schedules.
- Flanges to be **AS4087Flanges for waterworks purposes** PN16 figure B5 (**AS2129** Table D).
- Socket and spigots and joint seals shall be as specified on the drawings or schedules.
- High Pressure applications (>16 Bar) shall be metal-seated valves to **AS/NZS2638.1 Gate Valves for Waterworks Purposes Part 2: Metal Seated**.
- Valves shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

2.7 Extension Spindles for Gate Valves

Extension spindles (for both resilient and metal seat valves) shall comply with **AS2638.1 Gate valves for waterworks purposes Part 1 Metal seated** Test J and **AS2638.2 Gate valves for waterworks purposes Part 2 Resilient seated** Test M.

Spindle lengths shall be as shown on the schedules and drawings.

Where extension spindles are fabricated using welding, all welding shall be carried out in accordance with **AS1554.1 Structural steel welding Part 1 Welding of steel** Category GP. Cast iron (including grey and ductile iron) components shall not be welded.

Where the materials used are not corrosion resistant to soil and ground water (e.g. plain carbon or low alloy steels) the extension spindle shall be coated using bitumen paint or synthetic resin based protection systems or thermal bonded polymeric coatings. Paint shall comply with **AS/NZS3750 Paints for steel structures**: **Part 4 Bituminous paints** for bituminous paints and **Part 19 Metal Primer – General Purpose** for synthetic resin base coatings. Thermal bonded polymeric coatings

shall comply with **AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes**.

2.8 Non-Return Valves DN80 and above

Non-Return Valves shall comply with **AS4794 Non-return valves for waterworks purposes – Swing check and tilting disc** and **AS5081 Hydraulically operated automatic control valves for waterworks purposes**. For valves up to and including DN300 the following minimum requirements shall apply:

- Valves shall be non-slam, non-clogging, resilient seat swing check valves.
- Valves shall be suitable for installation in either horizontal or vertical pipework.
- Pressure classification: PN 16 minimum
- Body and bonnet: Ductile iron to **AS1831 Ductile cast iron**.
- Check disk: Nylon/steel reinforced NBR complying with **AS1646 Elastomeric seals for waterworks purposes**.
- Gasket: NBR complying with **AS1646 Elastomeric seals for waterworks purposes.**
- Pins, blots nuts and washers: Stainless steel Grade 316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products** or equivalent ASTM grade
- Internal and external surfaces shall be coated with a polymeric coating in accordance with **AS/NZS 4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes.**
- Flanges to be **AS4087 Flanges for waterworks purposes** shall be raised face PN16 figure B5.
- Valves shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

Non-return valves larger than DN300 shall be individually specified.

Where water hammer in the pipe system may be a problem, non-return valves shall be as specified by the Manager, Technical Division.

2.9 Gate Valves and Non Return Valves less than DN80

Generally ball valves are preferred over gate valves for valves DN80 and under. However, gate valves may be used upon approval from the Manager, Technical Division.

Valves less than DN80 shall be manufactured to **AS1628 Water supply – Metallic gate, globe and non-return valves.** Unless otherwise approved, the following specifications shall also apply:

- Materials shall be dezincification resistant brass complying with **AS1565 Copper and copper alloys- ingots and castings**, dezincification resistant to **AS2345 Dezincification of copper alloys**.
- All valves [body] shall be clearly bear the mark DR to signify dezincification resistance properties.

- Pressure rating shall be a minimum of PN20.
- End Joints shall be internally (BSP) threaded to **AS1722.1 Pipe threads of Whitworth form Part 1 Sealing pipe threads**.
- All valves shall be CLOCKWISE CLOSING, hand wheel operated.
- Cast iron hand wheels for gate valves shall be polymeric coated to **AS/NZS 4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes**.

2.10 Air Release and Vacuum Valves

Air release and vacuum valves shall comply with **AS4956 Air valves for water supply** with the following minimum requirements:

- Air valves shall be automatic, kinetic or combined type as shown on the drawings or schedules.
- Automatic air release valves shall be capable of the release of air under pressure during normal operation.
- Kinetic air valves shall be capable of ensuring the release of large volumes of air during pipeline filling and the inflow of air when the pipeline is emptied.
- Air release and vacuum valves (double acting air valves) shall be capable of operating in a combined automatic and kinetic mode ensuring the release of large volumes of air during pipeline filling, the inflow of air when the pipeline is emptied and, the release of air under pressure.
- Maximum Pressure rating: PN16
- Body: ductile iron to **AS1831 Ductile cast iron** for sizes DN50 and above
- Float: ABS or stainless steel Grade 304 or better
- Seals: EPDM complying with **AS1646 Elastomeric seals for waterworks purposes**.
- Coating: thermal bonded polymeric coating or fusion bonded epoxy to **AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes**.
- Valves up to DN50 shall have BSP threaded inlet connections.
- Valves greater than DN50 shall have flanged inlet connections to **AS4087Flanges for waterworks purposes** PN16 figure B5.
- Air valves shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

2.11 In-line Strainers

Inline strainers shall be “Y” pattern or similar with low headloss under flow conditions and with easy access to sieve for cleaning. The following minimum requirements shall apply.

- Pressure Rating: 16 Bar
- Flanges: flanged units with flanges drilled to **AS4087Flanges for waterworks purpose**s PN16 figure B5.
- Body and Cover Flange: Ductile iron to **AS1831 Ductile cast iron**.
- Coating: thermal bonded polymeric coating or fusion bonded epoxy to **AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes.**
- Seals: NBR complying with **AS1646 Elastomeric seals for waterworks purposes.**
- Sieve: Stainless steel Grade 304 or 316 to **AS1449 Wrought alloy steels – stainless and heat resisting steel plate, sheet and strip** or equivalent ASTM grade. Sieve to be heavy duty and suitable for application.
- Bolts: Stainless steel Grade 316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products** or equivalent ASTM grade.
- Sieve Accessibility. Sieve is to be accessible from the top to allow for easy removal and cleaning.

2.12 Fire Hydrants

The hydrant type shall be as shown on the drawings and schedules. Generally Screw-Down Hydrants (Squat type) are preferred. All other types may be used upon approval from the Manager, Technical Division.

2.12.1 Spring Type Hydrants

Spring type hydrants shall comply with **AS3952 Spring hydrant valves for waterworks purposes** with the following minimum requirements:

- Model: shall have removable internal components to allow full bore access to the pipeline for the insertion and removal of swabs
- Rated pressure: 16 Bar
- Seat infiltration resistance: 0.5Bar (vacuum)
- Body and yoke: to be Ductile Iron to **AS1831 Ductile cast iron**.
- Dome: LG2 Gunmetal Brass to **AS1565 Copper and copper alloys- ingots and castings**, dezincification resistant **AS2345 Dezincification of copper alloys**.
- Bolts, nuts and washers: Stainless steel Grade 316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products** or equivalent ASTM grade.
- Gaskets and O-rings: EPDM and NBR respectively complying with **AS1646 Elastomeric seals for waterworks purposes**.
- Coating: fusion bonded epoxy to **AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes**.

- Inlet: Flanged end of DN80 or DN100 to **AS4087 Flanges for waterworks purpose**s PN16 figure B5 as shown on the schedules
- Outlet to be fitted with removable threaded UV stabilised PE dust cap.
- Hydrants shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

2.12.2 Screw Down Hydrants (Squat and Tall)

Screw-down hydrants shall be DN80 and shall be manufactured to British Standard **BS750/NZS 1152 Underground fire hydrants and surface box frames and covers,** with respect to hydrant height flow rates and outlet connection details (Screwed end of 65 mm diameter with external BSP thread of pitch 5.08 mm) and key dimensions.

Unless otherwise approved, the following specifications shall also apply:

- The hydrant is to be CLOCKWISE CLOSING.
- Gland packing not permitted, and seal rings shall be used complying to **AS1646 Elastomeric seals for waterworks purposes.**
- All exposed components shall be stainless steel Grade 316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products** or equivalent ASTM gradeorLG2 Gunmetal Brass to **AS1565 Copper and copper alloys- ingots and castings**, dezincification resistant **AS2345 Dezincification of copper alloys.**
- A drain boss or air release point on the hydrant outlet side is not required.
- Body and Bonnet to be Ductile Iron to **AS1831 Ductile cast iron** and FBE coated to **AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes.**
- Inlet: Flanged end of DN100 to **AS4087 Flanges for waterworks purposes** universally drilled to **AS2129 Flanges for Pipes, Valves and Fittings** Table D, DN80/DN90
- Outlet screw end to be fitted with blank cap or plug, attached to the body with a suitable lug, S-hook & chain.

2.13 Pressure Reducing Valves

Pressure reducing valves (PRVs) shall comply with the requirements of **AS5081 Hydraulically operated automatic control valves for waterworks purposes** complying with the following minimum requirements:

- The PRV shall reduce higher upstream pressure to lower preset downstream pressure regardless of fluctuating demand or varying upstream pressure.
- Main Valve: The main valve shall be a center guided, diaphragm actuated globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path, with no stem guides, bearings, or supporting ribs.

- Body and cover: to be Ductile Iron to **AS1831 Ductile cast iron.**
- Coating: thermal bonded polymeric coating or fusion bonded epoxy to **AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes.**
- Flange: PRVs shall be supplied as flanged units with flanges drilled to **AS4087Flanges for waterworks purposes** PN16 Figure B5
- Fittings: either LG2 Gunmetal Brass to **AS1565 Copper and copper alloys- ingots and castings**, dezincification resistant to **AS2345 Dezincification of copper alloys** or stainless steel Grade 304/316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products.**
- Accessibility: All valve components shall be accessible and serviceable without removing the valve from the pipeline.
- Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall be center guided by a bearing in the separating partition. The replaceable radial seal disk shall include a resilient seal and shall be capable of accepting a V-Port Throttling Plug by bolting.
- Control System: The control system shall consist of a 2-Way adjustable, direct acting, pressure reducing pilot valve, a needle valve, isolating cockvalves, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements.
- Downstream Pressure Settings: The PRVs shall be capable of meeting the downstream pressures as specified in the drawings and schedules.
- Factory Setting and Certification: All PRV units shall be factory set prior to shipping to the prescribed downstream pressures and come with appropriate certificates/proof of settings against individual serial numbers of the valves.
- The assembled valve shall be hydraulically tested.

2.14 Pressure Relieving Valves

Quick acting pressure relieving valves (PReVs) shall comply with the requirements of **AS5081 Hydraulically operated automatic control valves for waterworks purposes** complying with the following minimum requirements:

- The Quick Pressure Relief Valve shall relieve excessive system pressure when this pressure rises above pre-set value. It shall immediately, accurately, and with high repeatability respond to system pressure rise by fully opening as well as provide smooth drip-tight closing.
- Main Valve: The main valve shall be a center guided, diaphragm actuated globe valve of angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The

valve shall have an unobstructed flowpath, with no stem guides, bearings, or supporting ribs.

- Body and cover: to be **Ductile Iron to AS1831 Ductile cast iron.**
- Coating: thermal bonded polymeric coating or fusion bonded epoxy **to AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes.**
- Flange: PRVs shall be supplied as flanged units with flanges drilled to **AS4087 Flanges for waterworks purposes** PN16 figure B5.
- Fittings: either LG2 Gunmetal Brass to **AS1565 Copper and copper alloys- ingots and castings**, dezincification resistant to **AS2345 Dezincification of copper alloys** or stainless steel Grade 304/316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products.**
- Accessibility: All valve components shall be accessible and serviceable without removing the valve from the pipeline.
- Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall be center guided by a bearing in the separating partition. The replaceable radial seal disk shall include a resilient seal and shall be capable of accepting a V-Port Throttling Plug by bolting.
- Control System: The control system shall consist of a 2-Way adjustable, direct acting, quick pressure relief pilot valve, a testing cock valve, and a filter.
- The assembled valve shall be hydraulically tested.

2.15 Reservoir Level Control Valves

Float control valves shall comply with the requirements of **AS5081 Hydraulically operated automatic control valves for waterworks purposes**.

Ball float valves are required for closing the water reservoirs inlets. Valves bodies shall be manufactured from materials suitable for the purpose. The lever shall be manufactured from non-corroding cast iron, mild steel or stainless steel and the float shall be manufactured from tinned copper or a suitable plastic. The body and sealing shall be streamlined to avoid shock on the valve, wear and cavitation at all of the operating conditions of the valve and the pipe work immediately downstream.

Valves for new steel storage tanks with a DN100 or DN150 inlet shall comply with the following or equivalent:

- Cla-Val W-series DN100/150 flanged 90-degree angle valve with
- CF1-C1 float, copper/bronze tube & fittings (model 8124-01).

Unless otherwise approved, the following specifications shall also apply:

- Threaded end connections shall comply with **AS 1722.2 Pipe threads of Whitworth form Part 2 Fastening pipe threads.**

- Flanged end connections shall be raised face and drilled to **AS4087 Flanges for waterworks purposes** PN16, figure B5 (or AS 2129 Table D).

2.16 Domestic Water Meter Isolation Valves

- Domestic water meter isolation valves shall be full bore, ¼ turn dezincification resistant (DZR) brass ball valves, manufactured to **AS4796 Water Supply – Metal-bodied and Plastic-bodied Ball Valves for Property Service Connection**.

- All water meter valves shall have BSP female-female threaded ends with lever handles.

- Unless otherwise specified on the drawings, water meter valves shall not be lockable.

- Where a lockable water meter valve is specified on the drawings, the locking mechanism will slide over the stem nut to prevent removal or tampering with the stem. The lock mechanism will allow the insertion of a padlock of diameter matching SWA's padlock system for service disconnections.

2.17 Bulk Water Meters

Water meters shall be manufactured to **AS3565.1 Meters for Cold Potable Water, Part 1: Volumetric Chamber and Turbine Meters.**

Where the meter is required to measure a wide range of flows, meters shall be manufactured to **AS3565.2 Meters for Cold Potable Water Part 2: Combination Meters.**

Unless otherwise approved, the following specifications shall also apply:

- All meters DN50 and above shall be fitted with an electronic output device (EOD).

- Threaded end connections shall comply with **AS1722.2 Pipes threads of Whitworth form: Part 2 Fastening pipe threads**.

- Flanged end connections shall comply with **AS4087 Flanges for waterworks purposes**, PN16, Figure B5.

2.18 Domestic Water Meters

Domestic water meters shall be 15mm NB bronze body, concentric meters to the requirements of **ISO 4064, BS 5728 Part 7 or OIML R49** with Class C measuring accuracy, providing maximum throughput with minimum headloss with a maximum working pressure of 12 Bar.

The meters shall be suitable for horizontal, inclined or vertical pipelines without loss of accuracy.

The Register shall be sealed and waterproof using O-ring seals or similar. Gland or stuffing box seals will not be acceptable.

The counter shall be an easily read seven (7) figure straight type recording to 0.1 cubic metres, accurate to ± 2% and fitted with a protective lid. The Register shall start recording at 4.0 litres per hour, and be capable of passing 4.5 cubic metres per hour with a maximum head loss of 0.1 meters.

2.19 Tapping Bands for Service Connections

Tapping bands shall comply with **AS/NZS4793 Mechanical tapping bands for waterworks purposes** with the following minimum requirements:

- Tapping bands shall be full circle type suitable for use with the pipe material and class specified in the drawings and schedules.
- Minimum working pressure: PN16.
- Body: LG2 Gunmetal Brass to **AS1565 Copper and copper alloys- ingots and castings**, dezincification resistant to **AS 2345 Dezincification of copper alloys**.
- Bolts: Stainless Steel Grade 316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products** for bolts and nuts and **AS1449 Wrought alloy steels – stainless and heat resisting steel plate, sheet and strip** for washers.
- Seals: NBR complying with **AS1646 Elastomeric seals for waterworks purposes**.
- Tapping bands for use with ductile iron pipework shall be internally lined to electrically insulate the band from the pipe.
- Tapping bands shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

2.20 Multi-fit Couplings (including Gibault Joints)

Universal or multi-purpose couplings shall comply with **AS/NZS4998 Bolted unrestrained mechanical couplings for waterworks purposes** with the following minimum requirements:

- Sleeve, end rings, flanges or clips: Ductile iron to **AS1831 Ductile cast iron** grade 400-15. End rings, flanges or clips may be provided in gunmetal brass to **AS1565 Copper and copper alloys-ingots and castings** grade C83600A
- Bolts, nuts and washers: Stainless Steel Grade 316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products** for bolts and nuts and **AS1449 Wrought alloy steels – stainless and heat resisting steel plate, sheet and strip** for washers.
- Joint seals: EPDM or NBR complying with **AS1646 Elastomeric seals for waterworks purposes**.
- Coatings: Ductile iron components to have thermal bonded polymeric coating to **AS/NZS4158 Thermal bonded polymeric coating on valves and fittings for water industry purposes** on internal and external surfaces. Coating on fastener threads to be 50-75 microns thick.
- Anti-galling: Stainless steel threads – molybdenum disulphide or Teflon dry film lubricant.
- Couplings shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

2.21 Stainless Steel Repair Clamps

Stainless steel pipe clamps shall comply with **AS4181 Stainless steel clamps for waterworks purposes** with the following minimum requirements:

- Clamps, studs, nuts and washers: stainless steel Grade 316 complying with **AS2837 Wrought alloy steels – stainless steel bars and semi- finished products** or equivalent ASTM grade
- Clamp seal: Nitrile butadiene rubber (NBR) elastomeric gasket complying with **AS1646 Elastomeric seals for waterworks purposes**.
- Fastening system: bolts to **AS/NZS1111 ISO metric hexagon commercial bolts and screws** and nuts to **AS/NZS1112 ISO metric hexagon nuts** or nuts and bolts to **AS/NZS1252 High strength steel bolts with associated nuts and washers for structural engineering**.
- Maximum operating pressure 16 Bar
- Clamps shall be certified as complying with the requirements of **AS4020 Products for use in contact with drinking water**.

Repair clamps shall be supplied as single, double or multi-part as follows:

- DN40-DN200 Single part
- DN225-DN450 Double part.
- >DN450 Multi-part

2.22 Marking Tape

Marking tape (detectable and non-detectable) shall comply with **AS2648.1 Underground marking tape Part 1 Non-detectable tape** with the following minimum requirements:

- Tape width shall be 100 mm.
- Tape for drinking water pipelines shall be coloured blue.
- The height of message letters shall be 40 mm.
- For drinking water pipelines the printed message on the tape shall be “CAUTION WATER MAIN BURIED BELOW”.

Detectable marking tape shall comply with the following additional minimum requirements:

- The tape shall include a tracer wire. The wire shall be stainless steel Grade 316 or copper alloy designation 122.
- The wire shall allow at least 25% elongation of the plastic tape before breakage of the wire.

2.23 Polythene Sleeving

Polythene sleeving shall comply with **AS3680 Polythene sleeving for ductile iron pipework** with the following minimum requirements:

- Sleeving shall be supplied in rolls with protective end flanges and perforated at intervals of 6.1 m.
- Sleeving for pipes and fittings conveying drinking water shall be blue.
- Sleeving shall be printed with the following message in letters at least 40 mm high corresponding to the sleeving colour and repeated at intervals such that the length of any unmarked pipe shall not exceed 1m:
    - For drinking water "DRINKING WATER".

2.24 Pressure Gauge Assemblies

Pressure gauge and stopcock assemblies shall meet the following minimum requirements:

- Pressure gauges shall comply with **AS1349 Bourdon tube pressure and vacuum gauges** with the following minimum requirements:
    - Liquid filled (glycerin), shockproof.
    - Pressure Rated to 16 Bar
    - Pressure display to 200 m
    - Minimum dial diameter 63 mm
    - Direct mount bottom entry ¼ " BSP female connection
    - Case, stainless steel with DR resistant gunmetal brass wetted parts
- Stopcocks shall be metal-bodied ball valves complying with **AS5830.1 In-line ball valves for use in plumbing water supply systems Part 1 metal bodied**. Ball valves shall be ¼ " with male-female connections for connection to a ¼ " BSP male tapped ferrule and the pressure gauge (or female- female with suitable connection fittings).

2.25 Sampling Taps and Hose Cocks

Sampling taps shall be a ½ " BSP male inlet bibcock or bib tap with DR resistant brass body compliant with **BS1010 Specification for Draw-off Taps Part 2** with flameproof taper nozzle, complete with dust cap & chain for sampling potable drinking water.

Hose cocks shall be a ¾ " BSP male bib tap with DR resistant brass body compliant with **BS1010 Part 2** with ¾ "brass hose union.

2.26 Manhole Covers and Frames

Manhole covers and frames shall comply with **AS3996 Access Covers and Frames** and the following minimum requirements:

- Size: as shown on the drawings and schedules
- Clear entry: all manhole covers and frames shall provide for a minimum clear entry of 900 x 900 mm or 1000 mm diameter.

- Class: areas subject to vehicular access – Class D, all other areas - Class B. Class D covers shall be non-rocking. Covers for water supply applications shall be watertight. Covers shall not be lockable unless shown otherwise on the drawings and schedules.
- Materials: Covers shall be manufactured from ductile cast iron conforming to **AS1831 Ductile cast iron**/ISO 1083 grade 500/10 or cast iron to **AS1830 Grey Cast Iron.**
- Skid resistance: Surface of cover is to be finished with a non-skid pattern raised 5 mm minimum.
- Protective coating: bituminous coating in accordance with Clause 2.7.1 of **AS3996 Access Covers and Frames** or with **AS/NZS3750.4 Paints for steel structures Part 4 Bituminous paints** applied to all non-sealing and non-threaded surfaces of the cover and frame. Sealing and threaded surfaces shall not be coated.
- Covers may be single of multi-part as shown on the drawings and schedules.
- Solid covers are preferred.
- Where concrete filled covers are required to meet the specified size requirements, then structural infill procedures in accordance with Appendix G of **AS3996 Access Covers and Frames** must be supplied with each delivery.

2.27 Surface Boxes for Underground Fire Hydrants

Unless otherwise approved, the following specifications shall apply:

- "FH" in capital letters cast-in to the centre of the cover with minimum lettering height of 80 mm
- Rectangular 380mm x 230mm clear opening
- Material – Ductile cast iron grade **AS1831 Ductile cast iron**/700 or Cast iron to **AS1830 Cast iron**
- Coating: Bitumen to **AS/NZS3750.4 Paints for steel structures Part 4 Bituminous paints**
- Loading – Heavy Duty to **AS3996 Access Covers and Grates**, Class D
- Surface of cover is to be finished with a non-skid pattern raised 5 mm

2.28 Surface Boxes for Underground Valves

Unless otherwise approved, the following specifications shall also apply:

- "SV" in capital letters cast-in to the centre of the cover with minimum lettering height of 75 mm
- Rectangular 300mm x 200mm clear opening
- Material – Ductile cast iron grade **AS1831 Ductile cast iron**/700 or Cast iron to **AS1830 Cast iron**

- Coating: Bitumen to **AS/NZS3750.4 Paints for steel structures Part 4 Bituminous paints**
- Vehicle Loading – Heavy Duty to **AS3996 Access Covers and Grates**, Class D
- Surface of cover is to be finished with a non-skid pattern raised 5 mm

2.29 Chain Link Fencing and Gates

Chain link fences and gates (including posts, rails, chain link mesh and wires) shall comply with **AS1725 Chain link fabric security fences and gates** with the following minimum requirements:

- Chain link fences and gates shall generally comply with the requirements of Standard Drawing W-026 except where varied by the contract specifications.
- All materials shall be heavy duty galvanised (W10Z). Alternatively, all materials may be black polyvinyl (PVC) coated, if specified by the contract.
- Standard duty galvanised materials are not acceptable as they do not comply with **AS1725 Chain-link fabric security fencing and gates.**
- Security fences shall be a minimum of 2100 mm high plus a minimum 3-strand barbwire extension, 450 mm high.
- Chain link mesh shall comply with the following:
    - Standard diamond pitch 50mm
    - Wire 2.5mm
    - Selvedge Knuckle-Knuckle (KK)
- Support cabling: 3.15mm diameter
- Tie wire: 1.57mm diameter (for tying mesh to support cables)
- Netting clips 19mm x 2.20mm (alternative to tie wire)
- Lacing wire: 2.00mm diameter (for tying mesh to posts and rails)
- Barbed wire: 1.57mm high tensile, long-life

2.30 Pumps

2.30.1 Small Booster Pumps

Smaller Booster pump stations shall have multistage pumps (with 100% standby capacity) with control panel, pipe work, surge protection and fittings constructed as a compact unit and mounted on a base frame.

2.30.2 Submersible Bore Pumps

Submersible Bore Pumps will be individually specified in the tender documents. All pump proposals shall comply with these specifications, and are subject to approval from the Manager, Technical Division.