# TWEED SHIRE COUNCIL

# MECHANICAL DESIGN SPECIFICATION

ME04

## VALVES

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## ABBREVIATIONS

| ABBREVIATION | INTERPRETATION |
|---|---|
| ABS | Acrylonitrile Butadiene Styrene |
| AC | Alternating current |
| AMP | Amperes |
| AS/NZS | Australian / New Zealand Standard |
| ASTM | American Society for Testing and Materials |
| BS | British Standard |
| DA | Development Approval |
| DICL | Ductile Iron Cement Lined |
| DN | Nominal Diameter |
| DR | Draft Australian Standard |
| EL | Tweed Council Electrical Specification |
| EMP | Environmental Management Plan |
| EPDM | ethylene propylene diene monomer |
| GRP | Glass Reinforced Plastic |
| ISO | International Standards Organisation |
| KL | Kilolitre |
| KPA | Kilopascal |
| L/S | Litres per second |
| MAOP | Maximum Allowable Operating Pressure |
| MM | millimetres |
| MPA | Megapascal |
| N | Newtons |
| PN | Nominal Pressure Class |
| PTFE | Polytetrafluoroethylene |
| PVC | Polyvinylchloride |

| ABBREVIATION | INTERPRETATION |
|---|---|
| RPZD | Reduced Pressure Zone Device |
| SG | Spheroidal Graphite |
| SS | Stainless Steel |
| V | Volts |
| WSAA | Water Services Association of Australia |
| WS-SPEC | Water Services Specification |

## 1 CITATION

This document is named "Tweed Shire Council, Mechanical Design Specification ME04 - Valves".

This document has the following functions:

- To relate to and comply with Tweed Shire Council's Land Development Specifications D11, D12, C401 and C402.
- To nominate the Water Services Association of Australia (WSAA) Codes and associated documents as the general requirements to be met for the Asset Creation process within the Tweed Shire Council Area of jurisdiction.
- To specify parameters, requirements and functions contained within the Codes that Council is to nominate or to amend.
- To specify additional technical and/or administrative matters (that are not otherwise specified within Australian Codes or Standards) pertaining to NSW Government Department of Planning.
- To specify any technical requirements not covered by the Codes.
- To identify materials, solutions and methods permitted by the Codes that are not acceptable to Council.
- To specify preferred options where the Codes provide for several methods to deal with a particular issue.

This document, as a Specification, is based upon compliance with the Sewerage Code of Australia (WSA-02), Water Supply Code of Australia (WSA-03), the Sewage Pumping Station Code of Australia (WSA-04), Vacuum Sewerage Code (WSA 06) and Pressure Sewerage Code of Australia (WSA 07)) and is complimented by the strategic product specifications and technical requirements contained within WS-SPEC National Water Industry Specifications.

WSA-02, WSA-03, WSA-04, WSA-06 and WSA-07 are available from the Water Supply Association of Australia (WSAA), email: info@wsaa.asn.au,

WS-SPEC and Australian Standards are available from the Saiglobal webshop at www.saiglobal.com/shop.

## 2 ORIGIN OF DOCUMENT – COPYRIGHT



## 3 VERSIONS

| VERSION | AMENDMENT DETAILS | CLAUSES AMENDED | DATE ISSUED (The new version takes effect from this date) | Authorised by the Director of Engineering Services |
|---|---|---|---|---|
| 1.1 | Draft for review | | 10-Sept-2007 | |
| 1.2 | Draft with Upgrades for Review | All | 18-Aug-2007 | |
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## 4 STANDARDS

In addition to the Standards listed under ME02, valves must comply with the following Australian Standards.

| | |
|---|---|
| AS 1565 | Copper and copper alloys - Ingots and castings |
| AS 1628 | Water supply - Metallic gate, globe and non-return valves |
| AS 1831 | Ductile Cast Iron |
| AS 2518 | Fusion-bonded low-density polyethylene coating for pipes and fittings |
| AS 2638.1 | Gate valves for waterworks purposes - Metal seated |
| AS 2638.2 | Gate valves for waterworks purposes - Resilient seated |
| AS 2845.1 | Water supply - Backflow prevention devices - Materials, design and performance requirements |
| AS 2845.2 | Water supply - Backflow prevention devices - Air gaps and break tanks |
| AS 2845.3 | Water supply - Backflow prevention devices - Field testing and maintenance |
| AS 3688 | Water supply - Metallic fittings and end connectors |
| AS 4020 | Testing of products for use in contact with drinking water |
| AS 4158 | Thermal-bonded polymeric coatings on valves and fittings for water industry purposes |
| AS 4794 | Non-return valves – swing check and tilting disc |
| AS 4795 | Butterfly valves for waterworks purposes |
| AS 4796 | Water supply - Metal bodied and plastic bodied ball valves for property service connection |
| AS 6401 | Knife gate valves for waterworks purposes |
| ASTM A126 | Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings |
| ASTM A313M | Standard Specification for Stainless Steel Spring Wire |
| ASTM A743M | Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application |
| ATS 5200.030-2007 | Technical Specification for plumbing and drainage products - Solenoid valves. |
| DR 05377 | Butterfly valves for general purposes |
| DR 07202 | Water supply - Backflow prevention devices - Part 1.1: Materials, design and performance requirements (to be AS2845) |
| DR 07285 | Water supply - Backflow prevention devices - Part 1.13: Reduced Pressure Zone Devices (RPZD) (to be AS2845.13) |
| DR 07310 | Air valves for sewage (to be AS4883) |
| DR 07318 | Air valves for water systems (to be AS4956) |

## 5 DEFINITIONS

In this document:

**"Standard"** shall mean and include a Standard Specification, Standard Code of Practice or other Standard issued by a recognised association or body set up for the purpose.

**"Australian Standard"** or the abbreviation "AS" shall mean a Standard issued by the Standards Association of Australia.

**"Draft Report"** or the abbreviation "DR" shall mean a draft of an Australian Standard issued by the Standards Association of Australia.

**"British Standar**d" or the abbreviation "BS" shall mean a Standard issued by the British Standards Association.

**"International Standard"** or the abbreviation "ISO" shall mean a Standard issued by the International Standards Organisation.

**"Principal** " – The Principal is as defined in GC21 and is Tweed Shire Council.

**"Principals' Authorised Person"** - is as defined is GC21

**"Contractor"** denotes the person or corporation bound to execute construction and related work on behalf of the Principal.

**"Designer"** means a company, consultant or Professional Engineer who is qualified and is competent to perform the engineering works required for the Asset Creation process on behalf of a Developer.

**"The Code"** means the Water Services Association Codes (Sewerage Code of Australia (WSA-02) and the Sewage Pumping Station Code of Australia (WSA-04) and Water Supply Code of Australia (WSA-03), Vacuum Sewerage Code (WSA 06) and Pressure Sewerage Code of Australia (WSA 07))

**"WS-SPEC"** means the National Standard Water Industry Specifications.

## 6 SCOPE OF WORK

The following is a description of the general scope of work included:

- Supply, factory testing and delivery of complete valves, including actuators, control solenoids and limit switches if automated.
- Where possible, valve numbering with stainless steel tags riveted to the body of the valve. One spare tag per valve supplied loose.
- Preparation and supply of 3 hard copies and 3 electronic copy of operating and maintenance manuals.
- Any special tools required for the installation and maintenance.
- Supply of all consumables required for commissioning (eg oil, grease).
- Supply of manufacturer's drawings.
- Supply of detailed installation drawings and instructions and procedures to allow installation, site testing and commissioning of the equipment.
- Preparation & supply of detailed electrical and pneumatic drawings for actuated valves.
- Provision of assistance for site installation, testing and commissioning.
- Training of operators and maintenance personnel.

- Site Testing and commissioning.

For all design and construction contracts, all alternatives to these specifications will require specific approval by the Principals' Authorised Person.

# 7 GENERAL REQUIREMENTS

## 7.1 General

Valves for Water Supply Applications shall be compliant with WSA 03-2002 Section 6.

Valves for Sewerage Applications shall be compliant with WSA 04-2005.

Each pipework system shall be supplied and installed with all valves necessary for the safe and efficient operation of the system. Sufficient valves shall be supplied and installed to enable individual items of equipment to be isolated and removed without affecting other equipment.

The number of different types and makes of valves used shall be kept to a minimum. All valves of the same size, duty and type supplied under the Contract shall be identical.

All parts of valves shall be suitable for the design pressure. The minimum operational design pressure for valves shall be 1600kPa for water supply and 1200kPa for sewer pipes under pressure. The valves shall be suitable for the design temperature, and the duty. Valve materials shall be suitable for the service conditions and shall be resistant to corrosion.

Valves shall be installed such that they are easily and safely accessible for operating, maintenance and removal purposes. Manual operation of the valves may be carried out with ease and without the need for any other extra equipment.

All valves shall be able to be removed from the line without obstruction from adjacent equipment, valves or pipework. Dismantling Joints will generally be required adjacent to non return valves and other equipment e.g. pumps and control valves etc. Unions may be installed for this purpose on pipes 50 mm nominal bore and smaller.

All valves shall be closed by a CLOCKWISE rotation of the hand wheel or handle. The face of each hand wheel shall be clearly marked with the words OPEN and SHUT with arrows adjacent to indicate the direction of rotation to which each refers.

Valves shall be constructed in accordance with the relevant Australian standard specifications.

All flanged valves shall be drilled off-centre to AS4087 table B5.

All valves and actuators installed shall have a proven record of reliable operation in similar environments and shall have readily available spare parts in Australia.

All ferrous alloy (cast iron, spheroidal graphite cast iron, plain carbon and alloy steel) valves shall have protective coatings to meet as a minimum AS2518 and AS4158 as applicable.

Valves shall be capable of opening against full unbalanced head and closing against full flow and shall open and close smoothly without vibration or cavitation.

Where hand wheels are specified the maximum effort required at the hand wheel shall not exceed 135 N under the worst conditions of differential head or unseating force.

The size, shape, strength and rating of all parts shall be of sufficient strength to provide an ample factor of safety under all working conditions. A safety factor of 1.25 shall be used for flanges (as per AS 4087).

Drainage holes shall be drilled or formed in any external pockets on the valve body or associated equipment, when necessary, to prevent moisture ponding.

The mass of the valve shall be stated and where necessary lifting lugs shall be provided.

The valve internal surfaces shall be devoid of sharp protrusions which may initiate secondary cavitation at high flow velocities.

Lubricants used shall meet the requirements of AS 3855 or AS4020 for pipelines containing potable water.

If valves requiring packing are permitted, the packing's shall be asbestos-free.

### 7.2 Factory marking

The following lettering to Australian Standards shall be marked on the body of valves equal to or greater than 80 mm diameter:

- Manufacturers Brand
- Valve size and type
- Year of manufacture
- An arrow denoting the preferred flow direction if applicable
- The Australian Standard of Manufacture

Where possible, the lettering shall be cast in the body of the valve. The lettering shall be in legible block type letters not less than 20 mm high and projecting not less than 3 mm. Where, owing to size or any other reason, casting of the above lettering is not practicable, such information shall be shown on an engraved stainless steel nameplate. This nameplate shall be permanently attached to a raised pad on the body of the valve casting using stainless steel fixings. The nameplate should be clearly visible after installation.

### 7.3 Materials of manufacture

All valves shall be manufactured of materials that are resistant to abrasion, corrosion, and cavitation and are suitable for the process stream in which they are installed.

Castings shall be made in accordance with the best foundry practice and shall be free from all defects. No holes or blemishes shall be filled with any substance, whatsoever, without written approval of the Principals' Authorised Person. No welding shall be permitted on cast iron components.

Valve components which are in turning or sliding contact with each other shall be of dissimilar corrosion resistant material.

## 8 GATE VALVES

### 8.1 Wedge gate valves

#### 8.1.1 General

Gate valves shall be of the wedge gate type unless noted otherwise.

Gate valves shall not be used for throttling purposes. Gate valves shall be provided to each pump connection pipe work in the valve pit.

Gate valves up to DN80 shall be in accordance with *AS 1628* '*Water supply - Metallic Gate, Globe and Non-Return Valves*'.

Gate valves up to and including size DN50 shall be internal threaded ends. Larger sizes shall be flanged unless otherwise specified.

Valves over 600 mm bore shall be fitted with a bypass incorporating an isolating valve. Isolating valves with 600 mm bore or less shall be fitted with a valve bypass if the manual operating force exceeds 135 N under maximum unbalanced head conditions.

Stop valves shall be resilient seat gate valves manufactured in accordance with AS2638.

For applications where the operating pressure exceeds 1600 kPa or where the valve size exceeds DN750, metal-seated valves shall be provided.

#### 8.1.2 Metal seated gate valves

Metal Seated Gate Valves shall be compliant with WS-SPEC section SP20.

Details of the alternative materials shall be submitted to the Principals' Authorised Person for approval.

#### 8.1.3 Resilient seated gate valves

Resilient seated gate valves shall be compliant with WS-SPEC Section SP-21.

Except as detailed in the clause for metal seated gate valves above resilient seated valves may be used.

Details of the alternative materials shall be submitted to the Principals' Authorised Person for approval.

### 8.2 Knife gate valves

Knife gate valves shall be compliant with AS 6401.

Details of the alternative materials shall be submitted to the Principals' Authorised Person for approval.

## 9 BALL VALVES

### 9.1 General

Ball Valves for property connections shall be compliant with AS4796 *'Water supply - Metal-bodied and plastic-bodied ball valves for property service connection'.*

Ball valves for potable water and air services shall be of stainless steel construction. Ball valves for chemical and sewerage applications shall be of a plastic or compatible metal material.

Ball valves shall have a minimum bore of 100% of the pipe area.

Ball valves shall be provided with an actuating handle or powered actuator as required.

All valves shall be mounted in such a position that the valve position indicator (T-handle when used) is plainly visible.

Metallic ball valves less than 50mm in size shall have internally threaded ends. Metallic ball valves 50mm and larger in size shall have flanged ends.

### 9.2 Plastic ball valves

All plastic valves shall be certified by the manufacturer as completely compatible with the intended and specified service.

Compatibility shall apply to the material of the valve and internal components, including all seals, gaskets, O-rings and washers.

Except as otherwise specified, valve ends shall be flanged or be socket-type with union ends, designed for solvent welding. The manufacturer shall provide specific recommendations for solvent and primer.

Plastic ball valves shall have a PN16 pressure rating at ambient temperatures, with reduced ratings for higher temperatures.

Ball valves for sodium hypochlorite solution service shall have the ball or body drilled as per the valve manufacturer's recommendations to permit venting of pressure and gas from the confined ball cavity when the valve is closed. The drilling shall vent to the upstream end of the valve. The drilling shall be 3mm opening, de-burred.

## 10 BUTTERFLY VALVES

Butterfly valves for potable water, recycled water and screened wastewater shall comply with AS 4795.

Butterfly valves shall not be used for flow control or for process streams which contain suspended solids, screenings or grit.

Where used for manual or automatic throttling of air flow, butterfly valves shall ~~generally~~ be one size smaller than the nominal diameter of the pipeline. The Contractor shall submit calculations to demonstrate that the required range of flows to be controlled lies within the controllable range of the valve (usually approximately 10 degrees to 80 degrees open).

Butterfly valves shall be installed so that they can be readily removed from the pipework when jammed in the open position.

For isolation purposes double flange or threaded hole lugged butterfly valves are required. Wafer type valves are not acceptable in buried applications. Wafer butterfly valves will only be considered for applications where the valve is not required for isolation or where specifically nominated in the schedule or with prior approval of the Principals' Authorised Person.

Metal seated butterfly valves shall be used for pump start up and shutdown throttling and other applications where throttling under high velocity and/or high pressure conditions are expected.

For other applications resilient seated butterfly valves shall be used.

Resilient seated butterfly valves shall generally be of replaceable seal on body design, with a synthetic or rubber lining covering the entire wetted surface of the valve and wrapping around the flange faces for effective sealing to the mating flanges, and incorporating integral O-rings for shaft sealing. The valve shall incorporate a bed grooving to hold the resilient valve body liner in place and shall be replaceable.

Other resilient seating arrangements such as seal on disk configurations or liner glued to the body or disk, must be referred to the Principals' Authorised Person for approval along with a guarantee from the manufacturer that the valve is suitable for the specific duty.

Valve seats shall be designed to be drip tight in both directions at the pressure differentials applicable to the supplied valve classes.

Valve discs shall be made of stainless steel, Aluminium Bronze or ductile iron (ductile iron for isolation applications only), with no external ribs. The disc shall seat at a 90 degrees angle to the axis of the pipeline.

Discs shall be fitted to the shaft using splines. Single piece through shafts are required. End stub shafts will be considered where specifically nominated in the schedule or with prior approval of the Principals' Authorised Person.

The valve body shall be provided with lifting lugs as required in ME 01.

For valve sizes 400mm and larger, fabricated or integrally cast support legs shall be provided.

Butterfly valves for buried or submerged applications shall have an extended stem shaft/spindle and visual indicators to indicate the position of the disc. The extended shaft/spindle stem cap and the indicator shall be mounted at the surface box or above the water level.

Butterfly valves in buried applications shall have adjustable torque limiting devices to prevent over travel of the valve disc in the open or closed position.

Manually operated butterfly valves in non buried applications up to 250mm in diameter shall have lever handles with Stainless Steel grade 316 ten (10) notch position setting plates. Manual lever type handles need to be capable of being removed and installed in either of two positions 180 degrees opposed.

The required manual maximum operating force shall not exceed 135 N. If necessary valves shall be provided with a gear box to meet this force requirement.

All Gear Boxes shall be of rack & pinion or worm types and shall be designed for retrofitting an electric actuator without major modification.

Gear operators shall be of the worm and segment type, grease packed and self-locking, with adjustable travel stops and position indicator. The housing shall be cast iron and the handwheel shall be have open/close direction arrows and be sized to limit the required rim pull to 135 N.

For buried and submerged applications Gear Boxes shall be provided with a watertight gear housing.

The Designer and Contractor shall ensure that the valves selected are compatible with the adjacent pipework such that valve manufacturer's sealing requirements are met between the pipe flanges and the valve liner (compensation flanges may be required to be supplied), and the valve disc does not interfere with the adjacent pipe or fitting.

Valves shall be located to ensure free access for maintenance and operation of the manual handle/ handwheel or actuator.

## 11 NON-RETURN VALVES

### General

Water Supply applications for diameters to 100 ball type Valve PN12 will be used unless otherwise specified.

Water Supply Applications for diameters 100 to 300 the Swing Check – Non return valve with resilient seated disc type Valve PN16 will be used unless otherwise specified.

Water Supply Applications for diameters above 300mm the Tilting disc type Valve PN16 will be used unless otherwise specified.

Sewerage Applications for all diameters the Swing Check – Non return valve with resilient seated disc type Valve PN12 will be used unless otherwise specified.

Swing Check and tilting disc non return valves shall comply with AS 4794-2001, "Non-Return Valves for Waterworks purposes-Swing Check and Tilting Disc".

Ball Check valves in Water Supply Applications shall be compliant with AS 1628-2001, "Water Supply-Metallic gate, globe and non-return valves".

### 11.1 Common requirements

Valve bodies and flap to be design to ensure solids are not collected at the base of the flap

Swing check and tilt disc type non-return (reflux) valves sized from DN100 to DN750 shall:

- Have a cast iron body,

- Have a clear opening at least equal to that of the connecting pipe,
- Comply with AS4794. Non-return valves for waterworks purposes—Swing check and tilting disc

Non-return valves that are less than DN100 shall:

- Have a bronze body,
- Have freely moving bronze faced discs,
- Comply with AS 1628.

Swing check non-return valves shall have a body cover that is located and sized to allow the flap to be removed and the seat to be inspected without removing the valve from the pipework. Provision shall be made for periodic lubrication of the trunnions.

If requires valves shall be provided with extended spindles and fitted with lever arms suitable for balance weights.

When specified in the Project Specification, no-flow limit switches shall be provided. No-flow switches for non-return valves shall be of the heat sensing proximity type and be suitable for the process fluid.

Unless approval is given by the Principals' Authorised Person, external cam operated limit switches are not permissible.

The no-flow limit switches shall have a minimum rating of ten (10) amps, 240V AC 50Hz, and be suitable for 25mm conduit entry.

## 12 GLOBE VALVES

Globe valves shall only be used for air or clean water applications.

Globe valves up to and including 50 mm nominal bore shall be screwed. Larger sizes shall be flanged.

Metallic globe valves up to DN100 shall comply with AS1628 '*Water supply - Metallic gate, globe and non-return valves'* .

Globe Valves will be specifically specified in the schedule.

## 13 PLUG VALVES

### 13.1 General

Plug valves shall be of the non lubricated eccentric type with a moulded elastomer covering the plug surface. The elastomer shall be suitable for the intended service. Plug valves shall have ports with a minimum of 100% flow area.

Plug valves 75 mm and above shall be furnished with a weld deposited nickel seat. Sprayed, plated or screwed in seats are not acceptable.

Valve bodies and plugs shall be of spheroidal graphite (SG) cast iron to AS1831. The plugs shall be of one piece construction with thrust washers on the upper and lower bearing journals to reduce torque and prevent foreign particles from entering the bearing and seal area.

Plug valves shall be flanged. Flanges shall be in accordance with AS4087 Table B5

All plug valves shall be manually operated by means of lever or a gearbox to allow a maximum manual force of 135N.

Alternative materials having strength, temperature and corrosion resistance characteristics equal or superior to those specified may be offered and a subject the approval of the Principals' Authorised Person.

Manual gearboxes shall be totally enclosed, weatherproof, grease lubricated type, with provision for on-line lubrication. The gearbox shall be operated by means of a hand wheel. The gearbox shall be self-locking in any position.

Alternative materials shall be in accordance with the materials specified in the relevant valve Standard.

| Information to be Supplied | Project Requirements |
|---|---|
| Valve type | Plug valve |
| Valve sizes | DN75 to DN900 |
| Materials: | |
| Body and bonnet materials | Ductile cast iron AS1831, 500-7 or 400-12 |
| Plug material | Ductile cast iron AS1831, 500-7 or 400-12 |
| Plug covering material | Moulded elastomer |
| Seat material | Nickel |
| Packing material | EPDM |
| Fasteners and Fixings | Grade 316 Stainless Steel. |
| Coatings | Fusion Bonded Epoxy or approved equivalent |
| Closure direction | Clockwise |
| Position indication | Required |

## 14 DIAPHRAGM VALVES

### 14.1 General

Diaphragm valves shall be in accordance with ISO 16138.

Diaphragm valves shall be weir or full bore type. All solids carrying lines shall be equipped with full bore diaphragm valves. Weir type valves may only be used on air or water pipelines.

The diaphragm shall be of an elastomer that is suitable for the process fluid.

All manual diaphragm valves shall have bonnet assemblies with a rising spindle and handwheel where the spindle is lubricated after each operation or the spindle is of stainless steel and has a distinctive visual indicator.

Diaphragm valve with pneumatic actuators shall be "air to open/spring to close" unless otherwise shown on the Valve Schedule. The actuators shall be of the diaphragm type and shall be purpose designed to suit the associated valve, the maximum line pressure anticipated and the supply air pressure.

A manual override and position indicator shall be fitted.

The diaphragm assembly shall be replaceable inline.

Diaphragm valves greater than 50 mm diameter shall be provided with flanged ends.

The diaphragm shall provide a uniform seal around the throat of the valve.

Details of alternative materials to that below shall be submitted to the Principals' Authorised Person for approval. Alternative materials shall be in accordance with the materials specified in the relevant valve Standard.

| Information to be Supplied | Project Requirements |
|---|---|
| Valve type | Diaphragm valve |
| Valve sizes | DN 25 to DN 300 |
| Valve pressure ratings | PN 10 |
| End connections | > DN50: Flanged to AS4087 |
| Flange classifications | To AS4087, Figure B5 |
| Valve standards | ISO 16138 |
| Materials: | |
| Body and bonnet | Ductile cast iron to ASTM A-126 CL |
| Liner material | Minimum = Cast Iron ASTM A-126 CL or suitable for the liquid flowing. |
| Diaphragm material | Selected to suit the fluid |
| Compressor material | Cast Iron ASTM A-126 CL |
| Spindle material | Mild steel or stainless steel |
| Spindle nut material | Brass |
| Body bolt material | 316 Stainless Steel |
| Closure direction | Clockwise |
| Flanged joint bolting selection (fasteners) | 316 Stainless Steel |
| Coatings | Approved epoxy finish |
| Flange gaskets, O-rings | EPDM, Nitrile or suitable for fluid carried. |
| Spindle type | Rising |

## 15 AIR RELIEF VALVES

### 15.1 General

Air relief valves located in buildings shall be provided with a discharge pipe to the area drain. For sewage applications, the drain shall be connected to the sewerage system.

All air relief valves shall be provided with an isolating valve to permit maintenance.

Air relief valves designed for water systems shall not be used on pressure sewer mains.

### 15.2 Air valves for water supply

Air valves for water supply shall be in accordance with DR 07318 (to be AS4956). This covers the following types of valves:

- Large orifice air valve (air/vacuum valve)

- Small orifice air valve (air release valve)
- Double orifice air valve (combination air valve)
- Anti-slam air valve
- Anti-vacuum valve (surge control air valve)

Unless otherwise specified, air-release valves shall comply with WSA 03-2002 Section 6.4.

Air-release valves shall vent accumulating air while the system is in service and under pressure.

The Principals' nominated brand of air valves are Ventomat Series RPS / RBX or ARI type valves for water applications. The use og other types of valves require the approval of the Principals' Authorised Person.

For details on Ventomat Air Valves, contact Jeremy Kerrigan (Sales and Marketing Manager) at Ventomat at jkerrigan@ventomat.com.au or visit www.ventomat.com.au.

For details on ARI air valves, contact Johan Cilliers at Amiad at johan@amiad.com.au or visit www.arivalves.com

### 15.3 Air valves for sewage

Air valves for sewage applications shall be in accordance with DR 07310 (to be AS4883). This covers the following types of valves:

- Large orifice air valve (air/vacuum valve)
- Small orifice air valve (air release valve)
- Double orifice air valve (combination air valve)
- Anti-slam air valve

Air-release valves for sewage shall vent accumulating gases during system operation. The valves shall have long float stems and bodies to minimize clogging. Each air release valve for sewerage shall be furnished with the following backwash accessories, fully assembled on the valve:

- Inlet shut-off valve.
- Blow-off valve.
- Clear water inlet valve.
- Rubber supply hose.
- Quick disconnect couplings.

Principal's nominated brand of air valves are Ventomat Series RGX or ARI type valves for sewage applications.

For details on Ventomat Air Valves, contact Jeremy Kerrigan (Sales and Marketing Manager) at Ventomat at jkerrigan@ventomat.com.au or visit www.ventomat.com.au.

For details on ARI air valves, contact Johan Cilliers at Amiad at johan@amiad.com.au or visit www.arivalves.com

## 16 AUTOMATIC HYDRAULIC REGULATING VALVES

The Principal's preferred brand of Pressure Regulating Valves is CLA-VAL Series 600.

For details on CLA-VAL pressure regulating valves visit www.cla-val.com or contact Glynn Nuthall of CLA – VAL in New Zealand at gnuthall@cla-val.com or Tyco Flowcontrol at 1300 656 609

### 16.1 Pressure reducing valve - large sizes

Pressure reducing valves shall comply with AS/NZS 4020 at a scaling factor of 0.1. Valves shall be lined and coated with a fusion bonded polymer in accordance with AS/NZS 4158.

Pressure reducing valve shall be Cla-Val or an equivalent approved by the Principals' Authorised Person.

Pressure reducing valves shall be installed with isolating valves upstream.

### 16.2 Pressure relief valves – small sizes

Pressure relief valves shall be angle pattern relief valves with the spring assemblies physically separated from the process medium. The relief valves shall include a lever actuator for manual opening of the valves. The valves shall be capable of passing the maximum required flow at 10% over the valve set pressure.

Pressure relief valve shall be Cla-Val or an equivalent approved by the Principals' Authorised Person.

### 16.3 Pressure sustaining valve

Unless specified otherwise, pressure sustaining valves shall be hydraulically operated, diaphragm actuated, globe valves.

The valve shall maintain constant, steady upstream pressure. The valve shall modulate according to the varying network flow.

Pressure sustaining valve shall be Cla-Val or an equivalent approved by the Principals' Authorised Person.

### 16.4 Surge Anticipating valves (Surge Protection)

Surge Anticipating valves shall be Cla-Val 52-03 or 652-03 or an equivalent approved by the Principals' Authorised Person.

### 16.5 Altitude Valves

Altitude valves shall be Cla-Val or an equivalent approved by the Principals' Authorised Person.

## 17 BACK FLOW PREVENTION DEVICES

This includes RPZD (Reduced Pressure Zone Device), DCV (Double Check Valve), DDCV (Double Detector Check Valve), SDCVFL (Single Detector Check Valve for Fire Line ), Dual CV( Dual Check Valve).

Backflow Prevention Devices shall be used for backflow prevention and shall be in accordance with DR007202 CP (to be AS2845.1 and DR 07285 (to be AS2845.13).

Only proprietary back flow prevention devices shall be used.

## 18 SOLENOID VALVES

Solenoid valves shall be compliant with ATS 5200.030-2007: Technical Specification for plumbing and drainage products - Solenoid valves.

Unless other wise specified all solenoid valves shall be from a single supplier and coils shall be continuously rated 24 V with protection to IP65 in accordance with AS1939. All valves shall be equipped with a manual means to operate the valve in the case of power failure.

The body of the solenoid shall be brass or stainless steel unless other wise specified.

The valve body and components shall be suitable for the individual service condition, including the process fluid, the temperature, the pressure and the external environment.

Also refer to Tweed Shire Electrical Design Specification EL13 Section 6.5 for specific requirements.

# 19 ACTUATORS

## 19.1 General

All valves fitted with actuators shall be fitted with proximity switches (pneumatic actuators), limit switches or micro switches (electric actuators) to tell when the valve is open and closed. Control devices shall satisfy the Principals' Electrical specifications EL 01 and EL 12.

All actuated valves shall be tested, with their respective actuators, to demonstrate smooth, trouble free operation between fully open and fully closed position, including full positional control if specified.

## 19.2 Electric actuators

Electric valve actuators including all components shall comply with relevant Principals' Electrical specifications EL 01, EL 04, EL 04 and EL 12.

Electric actuators shall be complete with position indicator, travel & torque limit switches and hand wheel override. The manual drive shall disengage when the motor drive is started and shall remain disengaged when the motor drive is operating. Maximum force on the rim of the handwheel shall be 135N.

The available torque operating margin shall be at least 25% greater than the required seating or unseating torque (which ever is the greater) of the valve. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure normal operation with the supply voltage varying within the limits nominated by the Principal.

## 19.3 Pneumatic actuators

The pneumatic cylinders shall have aluminium bodies aluminium or GRP cylinders, steel shafts and 316 stainless steel trim/fastenings and shall be suitable for operation from a compressed air system with a pressure range between 550 kPa and 800 kPa. Pneumatic cylinders shall be of the double acting type with the direction of operation determined by a solenoid operated spool valve. Control devices shall satisfy the Principals' Electrical specifications EL 01 and EL 12.

The body and all the fittings on the actuator shall be pressure rated to at least 1000 kPa. Need some safety margin above operating pressure.

The available force operating margin shall be at least 30% greater than the required seating or unseating force (which ever is the greater) of the valve.

The air control solenoid shall be mounted either directly or via a bracket to the body of the actuator. The actuators shall be capable of having accessories such as solenoid control valves, proximity switches and high visibility positioners attached directly to the body of the actuator or separately in a remote box.

Quarter Turn Pneumatic actuators shall be a compact rack and pinion type with double piston, internal air ports, adjustable travel stops and shall be grease lubricated for life.

Linear pneumatic actuators shall be diaphragm or piston style pneumatic actuators suitable for the automation of diaphragm, gate or knife gate valves.

## 19.4 Testing of Valves

### 19.4.1 Testing of Knife Gate Valves

Knife Gate valves shall be tested in accordance with the test procedures of the WS-SPEC SP 23, Appendix A.

### 19.4.2 Testing of Air Valves

Air valves shall be tested in accordance with the test procedures of the WS-SPEC SP 27, Appendix A.

### 19.4.3 Testing of Gate, Non return Valves, Plug Valves

The Contractor shall carry out the following tests at his own cost in the works of the Valve Manufacturer before the valves are shipped.

**Test No.1 — Body Test –** The valve shall be blanked off at both ends and a body test pressure of 1.5 times the valve rated pressure shall be applied for 5 minutes with the plug in the partially open position. No leakage shall be visible.

**Test No.2a — Plug or Gate Test –** The valve shall be blanked off at the upstream flange only, and a test pressure of 1.5 times the valve rated pressure shall be applied for 5 minutes with the valve in the closed position. There shall be no visual evidence of structural damage to the plug or of leakage through the plug itself.

**Test No.2b -** While the valve is set up in this position a test pressure equal to the working pressure specified shall be applied and the valve shall be partially opened to prove that the rim force required on the hand wheel does not exceed 180N.

**Test No.3 — Seat Test –** The valve shall be blanked off at the downstream flange and a test pressure equal to the valve rated pressure shall be applied for 5 minutes with the valve in the closed position. No leakage past the valve seat shall be observed when the test is made. All tests shall simulate a valve in a terminal position held rigidly at one end only. In this condition, the valve shall be blanked off in such a manner that the axial hydraulic force is not externally restrained. This simulates a valve in a fully differential pressure situation held rigidly at one end only.

### 19.4.4 Testing of Ball Valves

Ball valves shall be tested in accordance with the test procedures in AS 4796 – "Metal Bodied and Plastic Bodied Ball Valves for Property Service Connection".

### 19.4.5 Testing of Butterfly Valves

Butterfly valves shall be tested in accordance with the test procedures in AS 4795 – "Butterfly valves for Waterworks purposes".

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