# GENERAL

## Related Sections

### Section 01300 - Submittals

### Section 01640 - Manufacturers’ Services

### Section 01810 – Equipment Testing and Facility Commissioning

### Section 09900 – Painting and Protective Coatings

### Section 15010 – Mechanical General Requirements

### Section 15200 - Process Piping and Fittings

## References

### Comply with the latest edition of the following statutes, codes, and standards, and all amendments thereto:

#### American Petroleum Institute (API):

##### API STD 600 (July 2015), Steel Gate Valves-Flanged and Butt-welding Ends, Bolted Bonnets

##### API STD 602 (Sept 2016), Steel Gate, Globe, and Check Valves for Sizes NPS 4 (DN 100) and Smaller For the Petroleum and Natural Gas Industries

##### API STD 608 (Nov 2012), Metal Ball Valves-Flanged, Threaded and Welding Ends

##### API STD 609(Apr 2017), Butterfly Valves: Double-Flanged, Lug and Wafer Type.

#### American National Standards Institute (ANSI):

##### ASME B16.1-2015, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

#### American Society of Sanitary Consultants (ASSE):

##### ASSE 1011-2004, Performance Requirements for Hose Connection Vacuum Breakers.

#### American Society for Testing and Materials (ASTM):

##### ASTM A216/A216M-16, Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service

##### ASTM A126-04(2014), Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

##### ASTM A276/A276M-17, Standard Specification for Stainless Steel Bars and Shapes.

##### ASTM A351/A351M-16, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts

##### ASTM A536-84 (2014), Standard Specification for Ductile Iron Castings

##### ASTM A564/A564M-13, Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes

##### ASTM B61-15, Standard Specification for Steam or Valve Bronze Castings

##### ASTM B62-17, Standard Specification for Composition Bronze or Ounce Metal Castings

##### ASTM B98-B98M-13, Standard Specification for Copper Silicon Alloy Rod, Bar, and Shapes.

##### ASTM B127-05(2014), Standard Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip

##### ASTM B139/B139M-12(2017), Standard Specification for Phosphor Bronze Rod, Bar, and Shapes.

##### ASTM B164-03(2014), Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire.

##### ASTM B194-15, Standard Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar

##### ASTM B584-14, Standard Specification for Copper Alloy Sand Castings for General Applications.

##### ASTM D429-14, Standard Test Methods for Rubber Property—Adhesion to Rigid Substrates

##### ASTM D1784-11, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

#### American Water Works Association (AWWA):

##### AWWA C111/A21.11-12, Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

##### AWWA C500-09, Metal-Seated Gate Valves for Water Supply Service

##### AWWA C504-15, Rubber-Seated Butterfly Valves, 3In. (75 mm) Through 72 In. (1,800 mm).

##### AWWA C508-09, Swing-Check Valves for Waterworks Service, 2 In. Through 24 In.(50-mm Through 600-mm) NPS

##### AWWA C509-09, Resilient-Seated Gate Valves for Water Supply Service.

##### AWWA C510-07, Double Check Valve, Backflow Preventer Assembly.

##### AWWA C511-07, Reduced-Pressure Principle Backflow Prevention Assembly.

##### AWWA C512-15, Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.

##### AWWA C514-15, Air Valve and Vent Inflow Preventer Assemblies for Potable Water Distribution System and Storage Facilities.

##### AWWA C516-14, Large-Diameter Rubber-Seated Butterfly Valves, Sizes 78 In. (2,000 mm) and Larger.

##### AWWA C541-16, Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates.

##### AWWA C542-16, Electric Motor Actuators for Valves and Slide Gates.

##### AWWA C550-13, Protective Interior Coatings for Valves and Hydrants

##### AWWA C606-15, Grooved and Shouldered Joints

##### AWWA C800-14, Underground Service Line Valves and Fittings

#### Manufacturers Standardization Society (MSS):

##### MSS SP 81-2017, Stainless-Steel or Stainless-Steel Lined, Bonnetless, Knife Gate Valves with Flanged Ends.

##### MSS SP 88-2015, Diaphragm Valves

#### NSF International (NSF):

##### NSF 61-2013: Drinking Water System Components—Health Effects.

##### NSF 372-2011: Drinking Water System Components – Lead Content

#### UL, ULC, UL/CSA

#### NEMA

##### Class F insulation

##### NEMA 250-2014, Enclosures for Electrical Equipment (1000 Volts Maximum)

#### University of Southern California (USC):

##### Foundation For Cross Connection Control and Hydraulic Research

#### The Chlorine Institute

##### Pamphlet 6) Piping Systems for Dry Chlorine (16th edition, March 2013)

## Measurement and Payment

.1 All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

## Submittals

### Shop Drawings, in accordance with Section 01300 - Submittals:

#### Product data sheets for make and model.

#### Complete catalog information, descriptive literature, specifications, and identification of materials of construction.

#### Power and control wiring diagrams, including terminals and numbers.

#### Complete motor nameplate data.

#### Sizing calculations for open close/throttle and modulating.

### Information Submittals, in accordance with Section 01300 - Submittals:

#### Certificate of Compliance for:

##### Electric operators; full compliance with AWWA C541-16 and AWWA C542-16.

##### Butterfly valves; full compliance with the requirements of AWWA C504-15.

##### API ANSI classes 300 and 600 valves; full compliance with API standards

#### Tests and inspection data

#### Manufacturer’s Certificate of Proper Installation.

#### Operation and Maintenance Manual.

##### API ANSI classes 300 and 600 valves; full compliance with API standards.

#### Certification of NSF 61 and NSF 372 compliance.

# PRODUCTS

## Approved Suppliers

### Actuator:

#### Rotork Controls (Canada) Ltd.

#### Flowserve Corporation (Limitorque Corporation).

#### Or Equivalent

### Backflow Preventer:

#### Watts Industries (Canada) Inc.

#### Conbraco Industries, Inc.

#### Or Equivalent

### Solenoid Valve:

#### ASCO Valve Canada, Division of Emerson Electric Canada Ltd.

#### Barber Coleman

#### Johnson Controls LP

#### Jefferson Solenoid Valves USA Inc.

#### Or Equivalent

### Air Release Valve

#### Val-Matic Valve & Mfg. Corp.

#### A.R.I. Flow Control Accessories Ltd.

#### APCO Valve and Primer Corporation

#### GA Industries

#### Cla-Val Canada Ltd

#### Or Equivalent

### Resilient Hinge Check Valves

#### Val-Matic

#### GA Industries

#### Or Equivalent

### Butterfly Valves

#### Val-Matic

#### Henry Pratt

#### GA Industries

#### Clow Valve Company

#### DeZurik

#### Or Equivalent

### Gate Valves

#### Trueline

#### Pinacle Stainless Steel

#### Pinnacle Industrial Supply

#### Or equivalent

### Ball Valves

#### Val-Matic

#### Bray International

#### Apollo

#### Watts

#### Or Equivalent

### Pressure Relief/Surge Anticipator Valve

#### Singer

#### Cla-Val

#### Ga Industries

#### Or Equivalent

## General

### All valves shall include the operator, actuator, hand wheel, chain wheel, extension stem, floor stand, worm and gear operator, operating nut, chain, wrench, and accessories for a complete operation.

### Valve shall be suitable for intended service. Renewable parts shall not to be of a lower quality than the specified in the Contract Documents.

### Valve shall be of the same size as adjoining pipe.

### Valve ends shall suit adjacent piping.

### Size operator to operate the valve for the full range of pressures and velocities

### All valves shall open by turning counterclockwise.

### Factory mount operator, actuator, and accessories

### Valves shall be compliant with NSF 61 and NSF 372 for potable water uses and conforming to recent lead content requirements for valves used in drinking water applications.

## Schedule

### Requirements relative to this section are shown on the Electric Operator Schedule, and Valve Schedule located at the end of this Section.

### Only major process valves are listed in the Valve Schedule. For all minor valves such as isolation valves for instrumentation, Air Release Valves, drains, and testing ports, refer to Contract Drawings.

## Materials

### Brass and bronze valve components and accessories that have surfaces in contact with water shall be alloys containing less than 16 percent zinc and 2 percent aluminum.

#### Approved alloys are of the following ASTM designations: B61-15, B62-17, B98/B98M-13 (Alloy UNS No. C65100, C65500, or C66100), B139/B139M-12 (Alloy UNS No. C51000), B584 (Alloy UNS No. C90300 or C94700), B164-03(2014), B194-15, and B127-05(2014)

#### Stainless steel Alloy 18-8 may be substituted for bronze.

## Factory Finishing

### Epoxy Lining and Coating:

#### Use where specified in the Contract Documents for the individual valves described in this Section.

#### In accordance with AWWA C550-13 unless otherwise specified in the Contract Documents.

#### Fusion bonded epoxy. NSF 61.

#### Minimum 0.18 mm dry film thickness except where limited by valve operating tolerances.

### Exposed Valves:

#### In accordance with Section 09900 – Painting and Protective Coatings.

#### Fusion bonded epoxy. NSF 61.

#### Safety isolation valves and lockout valves with handles, hand-wheels, or chain wheels shall be “safety yellow.”

## Valves

### Gate Valves:

#### Gate Valve 75 mm and Smaller:

##### Threaded stainless steel. Class 200 WOG. PTFE Seal.

#### Gate Valves 75 mm to 300 mm for Fire Protection:

##### UL/ULC listed, iron body, bronze mounted, rising stem, outside screw and yoke, ASME B16.1-2015 flanged ends, rated 1,207 kPa WOG.

##### Double disc type gate, bronze wedge pins, parallel seat, gate stem in bronze bushing through stuffing box.

### Ball Valves:

#### Stainless Steel Ball Valves 50 mm and Smaller:

##### Two piece ASTM A276-17 GR 316 or ASTM A351/A351M-16 GR CF8M stainless steel body and end piece, threaded ends, full port, ASTM A276-17 Type 316 stainless steel ball, reinforced PTFE seats and seals, PTFE packing, blowout proof 316 stainless steel stem, stainless steel lever operator with vinyl grip, rated 10,350 kPa WOG, 1,035 kPa SWP, MSS-SP-110, ASME B1.20.1, ASME B16.34. All valve parts to be NSF61 approved.

### Butterfly Valves:

#### General:

##### Valves specified as AWWA C504-15 shall be in full compliance with AWWA C504-15 and the following requirements:

###### Suitable for throttling operations and infrequent operation after periods of inactivity.

###### Elastomer seats shall be field adjustable and replaceable.

###### Bubble tight with rated pressure applied from either side.

###### No travel stops for disc on interior of body.

###### Self-adjusting V type or O-ring shaft seals.

###### Isolate metal to metal thrust bearing surfaces from flow-stream.

###### Ductile iron disc with stainless steel disc edge.

###### NSF-61 and NSF 372 epoxy internal/external.

#### Butterfly Valves 75 mm to 1,830 mm:

##### Flanged end to ANSI/ASME B16.1, short body type. Class 150B.

##### AWWA C504-15,

##### Cast iron body or ASTM A536 ductile iron body, disc to ASTM A126 Class B or to ASTM A536 ductile iron with Type 316 stainless steel seating edge, Type 316 stainless steel shaft and hardware, EPDM resilient rubber seat, and stainless steel seating surface. NSF 61 and NSF 372 epoxy internal/external.

##### 862 kPa working pressure rating.

### Check Valves:

#### Resilient Hinge Swing Check Valves 100 mm and 300 mm:

##### AWWA C508, flanges in accordance with ANSI B16.1, Class 125, cast iron or ductile iron body, full body flanged type to provide 100% pipe flow area, with no restrictions at any point, through the valve, Buna-N ASTM D2000-BG disc, disc accelerator enclosed within the valve and field adjustable and replaceable without the removal of the valve from the line, disc with no drilled holes or openings to retain the accelerator, stainless steel hardware, interior and exterior fusion bonded epoxy coating.

##### Valves to be equipped with threaded backflow actuator and visual open/close indicators.

##### Valves rated to 1035 kPa CWP, non-shock.

### Self-Contained Automatic Valves:

#### Air Release Valves 13 mm to 150 mm:

##### Suitable for potable water service, automatically exhaust small amounts of entrained air that accumulates in a system, in CLOSED position, seat against resilient seat to prevent water leakage.

##### Rated 1,035 kPa working pressure, cast iron, ductile iron body and cover, stainless steel float and trim, NPT threaded inlet and outlet, built and tested to AWWA C512-15.

#### Sampling Valves:

##### Type 316 stainless steel wetted parts, hand operated iron crank, piston to extend to inner surface of vessel or pipe, sealed by two compressible replaceable Teflon rings, one above discharge port and other below discharge port, [19 mm NPT inlet and 19 mm NPT outlet] [25 mm NPT inlet and 25 mm NPT outlet].

#### Solenoid Valves 6 mm to 50 mm:

##### Two way internal pilot operated diaphragm type, brass body, resilient seat suitable for air or water, solenoid coil molded epoxy, NEMA insulation Class F, 120 volts ac, 60 Hz, unless otherwise indicated in the Contract Documents. Solenoid enclosure NEMA 250, Type 4 unless otherwise indicated in the Contract Documents. Size and normal position as indicated in the Contract Documents or to suit the function of the Level Control Valve, where applicable.

##### Minimum operating pressure differential no greater than 35 kPa (gauge), maximum operating pressure differential not less than 863 kPa (gauge).

#### Level Control:

##### Hydraulically operated, diaphragm actuated, dual-solenoid pilot controlled globe valve, ductile iron, body, ANSI Class 150flanged ends, stainless steel trim, and stainless steel stem -strainers,

##### Equipped with pilot line isolation valves, Y-strainer, X101 valve position indicator (4-20mA), open/closing solenoids (120VAC/single phase), solenoid by-pass valves. Solenoid valve shall be CSA certified

##### Pilot lines shall be 316 stainless steel tubing with compression or threaded fittings NSF 61 and NSF 372 (as applicable) approved fusion bonded epoxy lining and coating installed in accordance with AWWA C550-13.

##### Size/Rating: As shown in the Valve Schedule.

## Operators

### Manual Operator:

#### General:

##### Operator force shall not exceed 18 daN under any operating condition, including initial breakaway. Gear reduction operator when force exceeds 18 daN.

##### Operator self-locking type or equipped with self-locking device.

##### Position indicator on quarter turn valves

##### Worm and gear operators shall be one piece design worm gears of gear bronze material. Worm hardened alloy steel with thread ground and polished. Traveling nut type operators shall be threaded steel reach rods with internally threaded bronze or ductile iron nut.

#### Exposed Operator:

##### Galvanized and painted handwheels.

##### Lever operators allowed on quarter turn valves 200 mm and smaller.

##### Cranks on gear type operators.

##### Chain wheel operator with tiebacks, extension stem, floor stands, and other accessories to permit operation from normal operation level.

##### Valve handles to take a padlock, and wheels a chain and padlock.

### Electric Operator:

#### General:

##### Comply with the requirements of AWWA C542-16AWWA C542-16.

##### Size to 1.5 times the required operating torque. Motor stall torque shall not exceed torque capacity of valve.

##### Controls integral with the actuator and fully equipped as specified in AWWA C542-16

##### Stem protection for rising stem valves.

#### Actuator Operation General:

##### Suitable for full 90 degree rotation of quarter turn valves or for use on multi-turn valves.

##### Manually override hand-wheel.

##### Valve position indication.

##### Operate from FULL CLOSED to FULL OPEN positions or the reverse in the number of seconds given in the Electric Operator Schedule.

#### Open Close/Throttling Service:

##### Size motors for one complete OPEN CLOSE OPEN cycle a minimum of once every 10 minutes.

##### Actuator suitable for throttling operation of valve at intermediate positions.

##### Integral OPEN STOP CLOSE pushbutton controls.

##### OPEN and CLOSED indicating lights.

##### Reversing motor starter with built in overload protection.

##### .

#### Actuator Power Supply:

##### 570 volt, three phase unless otherwise indicated in the Contract Documents.

##### Control power transformer, 120 volt secondary.

##### Externally operable power disconnect switch.

#### Enclosure:

##### As defined in NEMA 250, Type 4.

##### Contain 120 volt space heaters.

#### Limit Switch:

##### Single pole, double throw (SPDT) type, field adjustable cam operated, with contacts rated for 5 amps at 120 volts ac.

##### Each valve actuator to have a minimum of two transfer contacts at end position, one for valve FULL OPEN and one for valve FULL CLOSED.

##### Housed in actuator control enclosure.

#### Control Features: Electric actuators with features noted in the Electric Operator Schedule.

## Accessories

### Tagging: 38 mm diameter heavy brass or stainless steel tag attached with No. 16 solid brass or stainless steel jack chain for each valve ½ inch and larger, bearing the valve tag number shown on the Valve Schedule.

### Limit Switch:

#### Factory installed limit switch by the actuator manufacturer.

#### SPST, rated at 5 amps, 120 volts ac

### Chain Wheel and Guide:

#### Hand-wheel direct mount type.

#### Complete with chain.

#### Galvanized or cadmium plated.

# EXECUTION

## Installation

### Flange Ends:

#### Flanged valve bolt-holes shall straddle vertical centreline of pipe.

#### Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.

### Screwed Ends:

#### Clean threads by wire brushing or swabbing.

#### Apply joint compound.

### PVC and CPVC Valves:

#### Install using solvents approved for valve service conditions.

### Valve Orientation:

#### Install operating stem vertical when valve is installed in horizontal runs of pipe having centreline elevations 1,476 mm or less above finished floor, unless otherwise shown.

#### Install operating stem horizontal in horizontal runs of pipe having centreline elevations between 1,476 mm and 2,057 mm above the finish floor, unless shown otherwise on the Contract Drawings.

#### Orient butterfly valve shaft so that unbalanced flows or eddies are equally divided to each half of the disc, i.e., shaft is in the plane of rotation of the eddy.

### Install a line size ball valve and union upstream of each solenoid valve, in line flow switch, or other in line electrical device, excluding magnetic flowmeters, for isolation during maintenance.

### Locate valve to provide accessibility for control and maintenance. Install access doors in finished walls and plaster ceilings for valve access.

### Chain Wheel and Guide: Install chain wheel and guide assemblies or chain lever assemblies on manually operated valves over 2,057 mm above finished floor. Where chains hang in normally traveled areas, use appropriate “L” type tie back anchors.

## Tests and Inspection

### Valve may be either tested while testing pipelines, or as a separate step.

### Test that valves open and close smoothly under operating pressure conditions. Test that two way valves open and close smoothly under operating pressure conditions from both directions.

### Inspect air and vacuum valves as pipe is being filled to verify venting and seating is fully functional.

### Count and record the number of turns to open and close valve; account for any discrepancies with the manufacturer’s data.

### Set, verify, and record set pressures for all relief and regulating valves.

### Automatic valves shall be tested in conjunction with control system testing. Set all opening and closing speeds, limit switches, as required or recommended by the Consultant.

## Manufacturer’s Services

### The valve(s) as listed below require manufacturer’s field services:

#### All valves in the Valve Schedule and Electric Operator Schedule

### Manufacturer’s Representative: Ensure that the manufacturer’s representative is present at the Site for the minimum number of person days listed below, travel time excluded:

#### 3 Person Days for installation assistance and inspection.

#### 3 Person Days for functional and performance testing and completion of the Manufacturer’s Certificate of Proper Installation.

### Refer to Section 01640 - Manufacturers’ Services, and Section 01810 - Equipment Testing and Facility Commissioning for additional requirements.

## Supplements

### The supplements listed below, attached following “End of Section,” form part of this Section.

#### Electric Operator Schedule

#### Valve Schedule

**END OF SECTION**

**ELECTRIC OPERATOR SCHEDULE (VNETJS)**

| Tag Number\* | Valve Type | Size ( mm) | Fluid | Maximum Operating Flow | Maximum P  (kPa) | Service | Travel Time (Seconds) | Control Features |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TWR\_MV1 | Butterfly | 600 | Potable Water | Not required | 1035 | Exposed | 30 | A,D,F,H |
| TWR\_MV2 | Butterfly | 600 | Potable Water | Not required | 1035 | Exposed | 30 | A,D,F,H |
| TWR\_MV3 | Butterfly | 600 | Potable Water | Not required | 1035 | Exposed | 30 | A,D,F,H |
|  |  |  |  |  |  |  |  |  |
| Service: O/C = Open‑Close, T = Throttling, M = Modulating  Control Features:  A = LOCAL‑OFF‑REMOTE selector switch with integral OPEN‑STOP‑CLOSE pushbutton control in LOCAL mode and provisions for remote OPEN‑STOP‑CLOSE control in REMOTE mode.  B = Operation from 120‑volt, single‑phase power.  C = Position feedback circuit which generates a 4 to 20 mA dc signal in proportion to valve position, capable of driving into loads up to 750 ohms at 24‑volt dc.  D = Auxiliary contact which closes when the HAND‑OFF‑AUTO or LOCAL‑OFF‑REMOTE switch is in the AUTO or REMOTE position.  E = Actuator shall open valve upon loss of signal.  F = Actuator shall remain in last position upon loss of signal.  G = Three SPDT 120‑volt interposing relays for remote OPEN‑STOP‑CLOSE control. Relays powered externally, thereby permitting valve control from greater distances.  H = Motor and control enclosure(s) NEMA 250, Type 7.  \*All Tags Preceded with “VNETJS\_” unless otherwise indicated  \* Equipment Tag list conforming to Tagging Standards in accordance with Design Guidelines Section 21 – Development and Maintenance of Asset Inventory and Tagging. | | | | | | | | |



**VALVE SCHEDULE (VNETJS)**

| Tag No. \* | Valve Type | Size (mm) | Inlet\*\*  Pressure | Outlet\* Pressure | Maximum kPa (gauge) | Flow (L/s) | Fluid |
| --- | --- | --- | --- | --- | --- | --- | --- |
| TWR\_MV1 | Butterfly | 600 |  |  | 1035 |  | Potable Water |
| TWR\_MV2 | Butterfly | 600 |  |  | 1035 |  | Potable Water |
| TWR\_MV3 | Butterfly | 600 |  |  | 1035 |  | Potable Water |
| TWR\_HV1 | Butterfly | 450 |  |  | 1035 |  | Potable Water |
| TWR\_HV2 | Butterfly | 450 |  |  | 1035 |  | Potable Water |
| TWR\_HV3 | Butterfly | 450 |  |  | 1035 |  | Potable Water |
| TWR\_HV4 | Butterfly | 450 |  |  | 1035 |  | Potable Water |
| TWR\_HV5 | Butterfly | 450 |  |  | 1035 |  | Potable Water |
| TWR\_LCV1 | Level Control | 450 |  |  | 1035 |  | Potable Water |
| TWR\_CV1 | Resilient Hinge Swing Check | 450 |  |  | 1035 |  | Potable Water |
| TWR\_CV2 | Resilient Hinge Swing Check | 450 |  |  | 1035 |  | Potable Water |
| TWR\_ARV1 | Air Release | 50 |  |  | 1035 |  | Potable Water |
| TWR\_ARV2 | Air Release | 50 |  |  | 1035 |  | Potable Water |
| \*All Tags Preceded with “VNETJS\_” unless otherwise indicated  \* Equipment Tag list conforming to Tagging Standards in accordance with Design Guidelines Section 21 – Development and Maintenance of Asset Inventory and Tagging.  \*Inlet Pressure = Set pressure for pressure relief valve or downstream set pressure for pressure reducing valve. | | | | | | | |