

SECTION 02641

VALVES AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

1. Furnish and install valves and miscellaneous appurtenances complete with all accessories, bolts and gaskets which are shown on the Drawings, are specified herein, or are otherwise required for proper installation and functioning of equipment or systems

B. Additional Requirements Specified Elsewhere

1. Section 01010: Summary of Work
2. Section 01340: Shop Drawings, Product data and Samples
3. Section 01400: Quality Control
4. Section 01600: Materials and Equipment
5. Section 01730: Operating and Maintenance Data

C. Related Requirements Specified Elsewhere

1. Section 02615: Ductile Iron Pipe
2. Section 02617: Steel Pipe
3. Section 02622: Plastic Pipe
4. Section 02708: Pressure Pipelines and Appurtenances
5. Section 02709: Gravity Pipelines and Appurtenances
6. Section 13300: Utility Control System
7. Division 15: Mechanical
8. Division 16: Electrical

1.2 SUBMITTALS

- ###### A. Catalog Data: Submit manufacturer's literature and illustrations sufficient to verify compliance with the specifications

B. Shop Drawings and Product Data in accordance with Section 01340

1. Dimensions
2. Construction details
3. Materials
4. Assembled weight
5. Wiring diagrams for electric motor activators and controls
6. Detailed pipe layout drawings clearly showing plug valve seat location and operator orientation for Engineer's review with shop drawing submittals for all plug valves

- C. Installation Instructions: Complete manufacturer's installation instructions
- D. Where various specifications are cited, such as AWWA or ASTM, submit signed certificates of compliance from the manufacturer stating the equipment meets those specifications
- E. Operating and Maintenance Data in accordance with Section 01730
 - 1. Maintenance instructions
 - 2. Parts lists

1.3 DELIVERY, STORAGE AND HANDLING

- A. Prepare valves and accessories for shipment according to AWWA C500 Section 6
 - 1. Seal valve ends to prevent entry of foreign matter into valve body
 - 2. Box, crate, completely enclose and protect valves and accessories from accumulations of foreign matter
- B. Storage of Products
 - 1. Protect all products from damage
 - 2. Plug all temporary openings to prevent entrance of dirt or foreign material
 - 3. Products which could rust or be damaged by the elements shall be protected with temporary coatings and coverings
- C. Handling of Products
 - 1. Valves shall be loaded and unloaded by lifting with hoists or skidded to avoid shock or damage
 - 2. Under no circumstances shall such materials be dropped
 - 3. Extreme care shall be used in the handling, storage and installation of valves, couplings, and operators to prevent damage and to insure proper performance

PART 2 - PRODUCTS

2.1 GENERAL

- A. Construction
 - 1. Actual valve length within $\pm 1/16$ " of specified or theoretical length
 - 2. Ends, except as otherwise specified or indicated on the Drawings
 - a. 2½" and smaller; threaded
 - b. 3" and larger
 - 1) Buried: Push-on or mechanical joint, ANSI A21.11
 - 2) Others: Flanges 125 lb., ANSI B16.1; mechanical joint, ANSI A21.11
 - 3. Refer to specified industry standards cited such as AWWA and ASTM
 - a. Submit suitable data to confirm conformance with referenced industry standards
- B. Shop Coating

1. Shop coat all ferrous metal surfaces of valves and accessories, both interior and exterior, for corrosion protection
 - a. Verify compatibility of all shop and field coating systems
2. Manufacturer's standard coating will be acceptable if it is functionally equivalent to the specified coating, compatible with the specified field coatings and suitable for exposure to raw domestic sewage and hydrogen sulfide environments
3. Materials
 - a. Asphalt varnish: Federal Specification TT-V-51
 - b. Coal tar epoxy: Tnemec 46H-413 Hi-Build Tneme-Tar, or equivalent
 - c. Polyamide epoxy: Tnemec Series N69 Hi-Build Epoxoline II, or equivalent
 - d. Polyurethane: Tnemec Series 1075 Endura-Shield II, or equivalent, suitable for exposure to hydrogen sulfide environment, non-immersion service
 - e. Rust inhibitive primer: Tnemec Series 37H-77, or equivalent
 - f. Rust preventative compound: Houghton Rust Veto 344, or equivalent
4. Surfaces to be coated
 - a. Polished or machined surfaces: Rust preventative compound
 - b. Unfinished surfaces except as otherwise specified
 - 1) Interior surfaces
 - a) Plug valves: Plastic coating, 6 to 8 mils
 - b) Gate valves: Thermosetting epoxy, 10 mils, Mueller HP Epoxy Coating or equivalent
 - c) All other valves: Asphalt varnish (two coats), coal tar epoxy or polyamide epoxy
 - 2) Exterior surfaces of valves to be buried or submerged: Coal tar epoxy or polyamide epoxy
 - 3) Exterior surfaces of valves to be located in manholes or vaults: Polyurethane or polyamide epoxy
 - 4) Exterior surfaces of all other valves: Rust inhibitive primer compatible with field applied top coat per Section 09900
 - c. Operators and accessories
 - 1) On valves to be buried or submerged: Coal tar epoxy or polyamide epoxy
 - 2) On valves to be located in manholes or vaults: Polyurethane or polyamide epoxy
 - 3) On all other valves: Rust inhibitive primer with field applied top coat per Section 09900

C. Manual Actuators

1. Provide manual actuators for all valves unless otherwise specified or indicated on the Drawings
 - a. Gate valves and other multi-turn operators, exposed service
 - 1) 6" and smaller: Handwheel
 - 2) 8" and larger: Geared actuator with handwheel
 - b. Plug valves, exposed service: Without electric motor actuators
 - 1) Lever operator
 - a) 4" and smaller valves
 - b) 6" valves where indicated on the Drawings
 - c) Maximum pull: 80 lbs.

- d) Withstand 200 lb. pull without damage
 - 2) Geared actuator with handwheel
 - a) 6" and larger valves
 - b) Totally enclosed worm gear operator
 - c) Handwheel diameter: 6"-18"
 - d) Maximum rim pull required: 80 lbs.
 - c. Plug valves, buried service
 - 1) Totally enclosed worm gear operator
 - 2) Wrench nut operator
 - 3) Extension stem to within 6-inches of grade
 - a) Provide spacers to center stem in valve box
 - b) Provide wrench operator of sufficient length to extend 42-inches above finish grade
 - d. Other buried valves, valves operated through floor boxes, and as indicated on Drawings: Wrench nuts
 - 1) AWWA C500 for gate valves
 - 2) Withstand 300 ft.-lbs. torque without damage
2. Rotation
- a. Counterclockwise (to the left) to open
 - b. The word "OPEN" and an arrow indicating the direction to open cast on each valve body or operator

D. Electric Motor Actuators

- 1. General
 - a. Provide electric motor actuators where indicated on the Drawings
 - b. Valve manufacturer to size actuator to accommodate torque and duty cycle requirements of the valve
 - c. Construction to comply with applicable portions of AWWA C540 Section 4
 - d. Actuator to be constructed as a self-contained unit; consisting of, but not limited to
 - 1) Ductile iron housing
 - 2) Motor
 - 3) Gearing
 - 4) Drive coupling
 - 5) Manual override handwheel mechanism
 - 6) Limit and torque switches
 - 7) Mechanical stops
 - 8) Position indicator
 - 9) Lubricants
 - 10) Heating elements
 - 11) Wiring
 - 12) Terminals
 - 13) Integral modulating electronic controller
 - 14) Status and alarm contacts for remote indication
 - e. Actuator power supply: 480 VAC, 60 Hz, 3-phase or 120 VAC, 60 Hz, single-phase as indicated on the Drawings
 - f. Actuator to be rated for a minimum of 600 starts per hour
 - g. Travel time (open to close and close to open): 60 seconds, adjustable
- 2. Motor
 - a. 90 VDC permanent magnet motor

- 1) DC current generated by control module
- b. Totally enclosed, non-ventilated, high torque, designed expressly for valve operator service
- c. Designed in accordance with applicable NEMA Standards
- d. Designed for continuous modulating duty
- e. Capable of operating valve under full differential pressure for two complete open-close cycles without overheating
- f. NEMA 4 enclosure
- g. Bearings: Permanently lubricated
- h. Voltage rating: Matched to electronic controller
- i. Voltage tolerance: $\pm 10\%$
- j. Insulation: Class F or better
- k. Rated for Class B temperature rise
- l. Overload protected by means of thermal sensors embedded in motor windings
- m. Mounted horizontally adjacent to or vertically above gearing
 - 1) Do not mount with motor vertical below gearing
- 3. Gearing
 - a. Hardened steel spur, helical, bevel and/or worm gears
 - 1) Planetary or cycloidal gearing and non-steel gear material will not be acceptable
 - b. Service factor: 2.0
 - c. All grease or oil bath lubricated
 - d. Designed to permit field ratio change
 - e. Self-locking; no restart until torque overload eliminated
 - f. Provided with lost motion device to allow motor to come up to speed before stem load is encountered in opening and closing direction
 - g. Anti-friction type bearings supporting all gears and shafting
 - h. Effectively sealed against entrance of foreign matter
- 4. Manual override handwheel mechanism
 - a. Designed so handwheel does not operate during motor operation
 - b. Designed so motor does not rotate when handwheel is rotated
 - c. Actuator responsive to electrical power and control at all times, automatically disengaging handwheel
 - d. Maximum force required: 80 lbs. of rim pull
 - e. Rotation: Counterclockwise to open
 - f. Arrow indicating the open direction and the word "OPEN" cast on the handwheel
- 5. Torque switches
 - a. Provide adjustable, mechanical, opening and closing torque limit switches
 - 1) Adjustment by means of individually calibrated stops
 - 2) Torque springs field replaceable without dismantling actuator or removing worm gear assembly
 - b. Limit torque and thrust loads in both the opening and closing directions
 - c. Micrometer adjustment and reference setting indicator on each switch
 - d. Adjustment to permit variation of approximately 40% in torque setting
 - e. Switch breaks control power circuit when
 - 1) An obstruction is encountered in either direction of travel
 - 2) Valve reaches mechanical stop in open or close position
 - f. Contact rating: 10 amps at 480 VAC, 10 amps at 120 VAC
- 6. Geared limit switches

- a. Provide minimum of six adjustable limit switches for each direction of travel
- b. Switches to be operated by driving mechanism
- c. Independently adjustable to trip at any point at and between valve full open and full closed positions
- d. Use of cams or screws to set switches will not be acceptable
- e. Contact rating: 10 amps at 480 VAC, 10 amps at 120 VAC
- 7. Mechanical stops
 - a. Provided to withstand maximum actuator torque
 - b. Adjustable over entire range of valve travel
- 8. Local position indication
 - a. Dial indicator
 - b. Graduated in 5% increments
 - c. In step with valve position in power or manual mode of operation
- 9. Heating elements
 - a. Provide in motor and geared limit switch compartment
 - b. Continuously energized
- 10. Terminal facilities
 - a. Provide terminal facilities in readily accessible compartment for connection to
 - 1) Motor leads
 - 2) Torque and limit switches
 - 3) Position transmitter
 - 4) Control module
 - 5) Heating elements
 - 6) Interface with control module and SCADA RTU for remote control
 - 7) Status and alarm contacts for remote indication in appropriate control panel and monitoring with plant SCADA system
- 11. Control module
 - a. Solid state, electronic, prewired
 - b. Control modules removable and replaceable in the field
 - c. Furnished with circuit breaker type safety disconnect
 - d. Equipped with space heater element, continuously energized to prevent condensation inside the control module enclosure
 - e. Provided with terminal block with connectors for all external controls
 - 1) All leads from actuator motor and limit switch assemblies to be routed to terminal connections in the control module enclosure for external connection to all other control devices
 - f. Enclosure: NEMA 4, integral with actuator
 - g. Automatic operation from a programmable logic controller which enables throttling for flow rate control
 - h. Proportional power variation to control DC motor speed and rotation
 - i. Action on loss of signal: Valve remains in last position
 - j. 4-20 mAdc input signal
 - k. Maximum input impedance 400ohms
 - l. Adjustments
 - 1) Zero
 - 2) Span
 - 3) Gain
 - 4) Deadband
 - 5) Maximum torque
 - 6) Default position

- m. Position comparator circuit
 - 1) Valve controlled by comparing two inputs (desired and actual)
 - 2) When desired setpoint moves outside the deadband, the valve is to move in the proper direction
 - 3) Motor controlled by variable DC voltage generated by position comparator circuit
 - n. Feedback potentiometer
 - 1) Compatible with position comparator circuit
 - 2) Mechanically connected to valve stem
 - 3) In step with valve position at all times
 - o. Position transmitter
 - 1) 1000 ohm potentiometer
 - 2) Mechanically connected to valve stem
 - 3) Separate from feedback potentiometer
 - 4) In step with valve position at all times whether operation is electric or manual
 - 5) For remote indication in appropriate equipment panel
 - p. Pilot devices
 - 1) Located in actuator enclosure
 - 2) Red "Open", green "Closed" and amber "Power On" indicating lights
 - 3) Hand-Off-Auto maintained selector switch
 - 4) Open and close pushbuttons
 - 5) Normally open seal in contacts for jogging open or close pushbutton in hand
12. Design basis
- a. EIM Controls Series 2000/M2CP Futronic III, or equal

2.2 VALVES

A. Gate Valves (Buried Service) – 12" and Smaller

1. Type: Mechanical joint; non-rising stem
2. Conformance: AWWA C509 or C515
3. Body: Ductile iron or cast iron body, fully bronze mounted, fusion bonded epoxy lined
4. Stem Seal: O-ring
5. Operator: 2" square operating nut
6. Gates: Resilient wedge
7. Pipeline gaskets: Size and type suitable for service with the type and O.D. of pipe connection
8. Valve boxes: Refer to Section 02708
9. See coating requirements
10. Acceptable manufacturers: Mueller, M&H, Waterous

B. Gate Valves (Buried Service) – 14" and Larger

1. Type: Mechanical joint; non-rising stem
2. Conformance: AWWA C509
3. Body: Cast Iron
4. Stem seal: O-ring
5. Operator: 2" square operating nut
6. Gates: Resilient wedge
7. Pipeline gaskets: Size and type suitable for service with the type and O.D. of pipe connection
8. Valve boxes: Refer to Section 02708
9. See coating requirements
10. Acceptable manufacturers: Mueller, M&H, Waterous

C. Gate Valves (Exposed Service) – 3-Inch and Larger

1. Type: Flanged ends; rising stem unless indicated otherwise on Drawings
2. Conformance: AWWA C509 or C515
3. Stem seal: O-ring
4. Operator: Handwheel
5. Gates: Resilient wedge
6. Pipeline gaskets: Size and type suitable for service with type and O.D. of pipe connection
7. See coating requirements
8. Acceptable manufacturers: Mueller, M&H, Waterous

D. Gate Valves (Exposed Service) – 2½-Inch and Smaller

1. Type: Bronze construction, rising stem
2. Conformance: Class 125
3. Stem seal: Screwed seal, teflon impregnated packing
4. Gates: Solid wedge
5. Design basis: Milwaukee, Stockham, Walworth

E. Butterfly Valves (Air Service)

1. Type: Wafer
2. Body: Cast iron
3. Disc: Bronze or cast iron with corrosion resistant metal plating
4. Shaft: AISI Type 304 or 316 stainless steel
5. Seat: EPDM or other elastomer
6. Shaft bearings: Bronze or reinforced teflon
7. Shaft seal: Synthetic rubber rings
8. Operator
 - a. Exposed service: Lever or handwheel as indicated on the Drawings
 - b. Buried service: 2" square operating nut
9. Valves and all components shall be suitable for
 - a. 15 psi air service
 - b. 100 ft/sec air velocity
 - c. Suitable for continuous operating temperatures up to 300°F
10. Design basis: Keystone, Crane, Sartell/DeZurik

F. Butterfly Valves (Liquid Service)

1. Type: Wafer or flanged, as shown on the Drawings
2. Conformance: AWWA C504, Class 150
3. Body: ASTM A126 cast iron
4. Seat: One piece rubber bonded to the body
5. Vane: Cast or ductile iron with 316 stainless steel edge
6. Operator: Refer to manual actuator specifications in Paragraph 2.1.C.
7. Design basis: Keystone, Pratt, Mueller, Sartell/Dezurik, or equivalent
8. Conduct factory hydrostatic and leakage tests in accordance with AWWA C504

G. Check Valves (Liquid Service) – 2½-Inch and Larger

1. Type: Unobstructed waterway, quick closing, spring loaded, horizontal swing
2. Conformance: Class 125
3. Body: Cast iron
4. Seat and seat rings: Bronze
5. Hinge pins: AISI type 304 or 316 stainless steel
6. Stuffing boxes: Outside, grease lubricated or O-ring seals
7. Design basis: Dresser; Mueller, Clow, American Valve & Hydrant

H. Check Valves (Liquid Service) – 2-Inch and Smaller

1. Type: Y-pattern, horizontal swing
2. Conformance: Class 125
3. Construction: All bronze
4. Design basis: Nibco, Stockham

I. Check Valves (Air Service) – 2-Inch and Larger

1. Type: Wafer style
2. Suitable for continuous operating temperature of 300°F
3. Single center hinge design with butterfly action sealing plates
4. Design basis: Hoffman Air Check Valve; Lamson Check Valve

J. Plug Valves

1. Type: Eccentric plug, opening motion lifting plug away from body seat, flanged or mechanical joint as shown on Drawings
2. Body: Semisteel ASTM A126, Class B; Cast Iron or carbon steel as required by pressure rating
3. Plug: Semisteel ASTM A126, Class B; Cast Iron or carbon steel as required by pressure rating
4. Plug facing: Neoprene or Buna-N, 70 durometer hardness
5. Seat: Cast into body, with raised welded-in nickel overlay, Brinnell hardness 200 min.
6. Upper and lower trunnion bearings: Sleeve type, 18-8 stainless steel or bronze
7. Upper thrust bearing: TFE or Delrin
8. Stem seal: V-type packing, Buna-N or TFE; U-type spring seals, neoprene
9. Valve port of at least 80% of connecting piping cross sectional area

10. Drop tight shutoff both directions at rated pressure
11. Pressure rating: 150 or 200 psi, as indicated in the valve schedule on the Drawings
12. Valve body plainly marked to indicate seat end
13. Provided with fully adjustable plug position stops
14. Valve bonnet stuffing box sufficiently deep for 4 packing rings
15. Stuffing box and packing gland designed to permit adjustment or replacement of packing without disassembly of valve or operator
16. Operator: Refer to manual actuator specifications previously stated in Paragraph 2.1.C.
17. Valve body ends to match connecting pipe
18. Design basis: Sartell/DeZurik, Milliken, or equivalent

K. Pinch Valve

1. Type: Full port, single action closing pinch valve
2. Sleeve: Buna-N
3. Body: Cast iron
4. Operator
 - a. Handwheel
 - b. Provide extension and support frame as necessary to accommodate dimensions and configurations shown on the Drawings
5. Exterior coating including handwheel extension
 - a. Coal tar epoxy for submerged or partially submerged applications
 - b. Hydrogen sulfide resistant Tnemec Series N69 Hi-Build Epoxoline II, or equivalent, for exposed service
6. Opening: Open left (counterclockwise)
7. Design basis: Red Valve Series 75

L. Ball Valves

1. Type: True Union
2. Materials
 - a. Body, ball and associated parts: PVC
 - b. O-ring seals: EPDM or Viton
 - c. Seat: Teflon
3. Pressure rating: 150 psig at 73°F
4. Full port design
5. Externally adjustable to compensate for seat wear
6. Heavy duty stub-acme thread seal carrier retaining ring
7. Design basis: Chemtral; Plastiline; or equivalent

M. Hose Bibs

1. Type: Anti-contamination, piping mounted
2. Material: Brass
3. Operator: Handwheel
4. Connection: NPT, male, size per Drawings
5. Design basis
 - a. Outside, frostproof: Watts Series FH, or equal
 - b. Inside: Watts Series SC, or equal

6. Hose bibs in the Headworks Building shall be sized as indicated on the Drawings and fabricated from the following components
 - a. PVC ball valve, as specified previously in this Section
 - b. Schedule 80 PVC nipple with compatible end connections for the ball valve and quick disconnect coupling
 - c. Stainless steel quick disconnect coupling for hose attachment

N. Pressure Regulating Valves

1. Application
 - a. Pump seal water system: ½" unless otherwise noted on the Drawings
2. Globe pattern
3. Body: Bronze
4. Valve trim: Bronze or stainless steel
5. Maximum inlet pressure: 100 psi
6. Normal flow: 1 gpm or less
7. Reduced pressure setting: 5 psi above associated pump shutoff head, or as recommended by manufacturer
8. Acceptable manufacturers
 - a. Cla-Val
 - b. Zurn/Wilkins
 - c. Watts
 - d. Or equivalent

O. Air Release Valves

1. Application: Locations and service conditions as shown on Drawings
2. Designed to release accumulation of air while pipeline is under pressure
3. Type: Float actuated
4. Body: Cast iron
 - a. Interior coatings: Manufacturer's standard coating system equivalent to Tnemec Series N69 Hi-Build Epoxoline II
 - 1) NSF approved for potable water applications
 - 2) Hydrogen sulfide resistant for wastewater applications
 - b. Exterior coatings: Primed for field painting
 - 1) Manufacturer's standard primer system compatible with Painting Schedule in Section 09900
5. Float system and linkage: Stainless steel
6. Seat: Buna-N
7. Pressure Rating: 150 psi
8. Size: Per Drawings
9. Inlet connection: Type per Drawings, compatible with size, type and pressure rating of isolation valve
10. Accessories: Isolation valve per Drawings
11. Design basis
 - a. Potable and nonpotable water pipelines: APCO Valve and Primer Corporation, Model No. 200A
 - b. Wastewater and process pipelines: APCO Valve and Primer Corporation, Model No. 400

P. Combination Sewage Air and Vacuum Relief Valves

1. Application: Wastewater and process pipelines
2. Designed to permit the following in a single valve body
 - a. Discharge air from empty pipeline when filling
 - b. Relieve vacuum when draining pipeline
 - c. Release accumulation of air while pipeline is under pressure
3. Valve to operate through a compound lever system that will seal both the pressure orifice and the air/vacuum orifice simultaneously
4. Materials
 - a. Valve body
 - 1) 316 stainless steel
 - 2) Cast iron with hydrogen sulfide resistant coating, interior and exterior
 - a) Hydrogen sulfide resistant coating: Tnemec Series N69 Hi-Build Epoxoline II, or equivalent
 - b. Internal linkage: Stainless steel
 - c. Float: Stainless steel
 - d. Large (air/vac) orifice seat: Buna-N
 - e. Pressure seat: Stainless steel
 - f. Pressure plunger: Stainless steel
5. Inlet and outlet size
 - a. Inlet and outlet to be of same size
 - b. Refer to the Drawings
6. Inlet connection: Flanged, compatible with isolation valve flange size, drilling and pressure rating
7. Operating pressure
 - a. Refer to schedule on the Drawings
 - b. Provide valves compatible with each pressure application
8. Valves to be hydrostatically tested to 150% of rated pressure
9. Valves to be furnished with protective cap to prevent dirt and debris from entering the valve outlet
10. Valves to be furnished with backflushing attachments
 - a. Hose assembly to include
 - 1) Fifty (50) feet of hose with quick disconnect couplings on both ends
 - b. Steel nipples, one for each flush connection
 - c. Flush connection valves
 - 1) 1" gate valves
 - 2) One for each flush connection
 - 3) Fitted with quick disconnect coupling for attachment of hose assembly
 - d. Isolation gate valve
 - 1) Same size as inlet connection
 - 2) Refer to previous paragraphs for specification requirements
11. Design basis: Crispin US Series, APCO Series 440, or equivalent

Q. Pressure Gauges

1. Type: Dial, liquid filled
2. Range
 - a. Discharge side of pumps: 0 to 150 psi
 - b. Suction side of pumps: 0 to 50 psi
 - c. Pump seal water system: 0 to 100 psi
 - d. Unless otherwise noted on the Drawings

3. Accuracy: 3% full scale range
4. Dial size: 3½" diameter, minimum
5. Accessories
 - a. Isolation ball valve on nipple
 - b. Snubbers on nipple
 - 1) Or diaphragm seal for wastewater and process piping, and where indicated on Drawings, Wika 990 Diaphragm Seal, or equal
6. Design basis: U.S. Gauge, Ashcroft, Dwyer, or equal
7. Install immediately upstream and downstream of each pump or as indicated on the Drawings

R. Sight Flow Indicators

1. Type: In-line flow meter
2. Range
 - a. Pump seal water: 0.2-2.0 gpm
3. Connections
 - a. Size: ½-inch
 - b. Type: Union
4. Stainless steel float
5. Design basis: Blue-White F-450N, or equal

S. Solenoid-Operated Valves

1. Type: 2-way, normally closed
2. Size: As indicated on the Drawings
3. Pressure rating: 150 psi
4. Material: Brass or bronze
5. Voltage: 120 VAC
6. Accessories
 - a. Pump seal water solenoid valves
 - 1) Provide valved bypass to allow manual seal water flow with solenoid valve removed
 - 2) Minimum size of bypass: ¾-inch
7. Design basis: ASCO, or equal

T. Floor Stands

1. Application: Where shown on Drawings
2. Size: Sized to accommodate extension stem from geared actuator and suitable for installation on concrete pad
3. Material: Cast iron
4. Heavy duty, non-rising stem with indicator
5. Design basis: Clow F-5515

U. Corporation Stops

1. Inlet: AWWA Taper Thread (Mueller Thread)
2. Outlet: Pack joint for PE piping
3. Design basis: Ford F 1001 Series, or equivalent

V. Insert Stiffeners

1. Application: All PE and PVC service line pipe
2. Size: Compatible with service line pipe I.D.
3. Design basis: Ford 70 Series for polyethylene pipe (PEP)

W. Service Clamps

1. Type: Hinged, single strap, brass saddle
2. Threads: AWWA Taper Thread
3. Design basis
 - a. Ford S-70 brass saddle for standard PVC pipe or equivalent
 - b. Ford S-90 brass saddle for C900 PVC pipe or equivalent
 - c. Ford brass saddle 202 B for ductile iron pipe or equivalent

X. Fire Hydrants

1. Type: Dry barrel
2. Conformance: AWWA C502
3. Outlet size: One 4½" pumper nozzle, two 2½" hose nozzles; with gasketed nozzle caps and chains
4. Outlet threads: NFPA No. 194, Appendix A, confirm acceptability with Owner prior to ordering
5. Hydrant size: 5¼" main valve opening
6. Inlet size: 6" mechanical joint, unless otherwise noted on Drawings
7. Bury: 5'-0", unless otherwise noted on Drawings
8. Operation: Open right (clockwise) via pentagon operating nut
9. Color: Mueller Fire Hydrant Red; Rustoleum 1210 Fire Hydrant Red, unless otherwise noted on Drawings
10. Special features: Provide traffic model hydrants with break-away bolts and couplings
11. Required make: Mueller Super Centurion 200, or equivalent
12. Refer to Drawings for Secondary Clarifier fire/emergency withdrawal hydrant requirements

Y. Yard Hydrant

1. Type: Exposed head, frostproof, yard hydrant
2. Size
 - a. Discharge: 1½" ANSI hose thread
 - b. Supply: 2" IPS threaded
 - c. Unless otherwise noted on Drawings
3. Bronze or brass operating valve and internal parts
4. Operating handle easily removable or lockable to prevent unauthorized use
5. Interior drain port valve
6. Accommodate nonpotable water lines at depth of cover shown on the Drawings
7. Design basis: Zurn Z1390, or equal

Z. Strainers

1. Provide in piping as indicated on the Drawings
2. Y-Pattern type
3. Brass or bronze body
4. Monel or stainless steel screen, opening size per Drawings
5. Minimum pressure rating: 150 psi
6. Design basis: Watts, Zurn/Wilkins, Hayward, or equal

AA. Curb Stops

1. Type: Tee head
2. Construction: Bronze
3. Design basis: Ford Meter Box, Hays, Mueller
4. Size as shown on Drawings

BB. Other Piping Accessories

1. Refer to Section 02708-Pressure Pipelines and Appurtenances

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine valves and appurtenances for cracks, flaws, or other defects
- B. Remove all defective valves and appurtenances from the site
- C. Repair or replace all damaged coatings
- D. If material is found to be defective by the Owner or Engineer, the Contractor shall promptly remove the defective material whether installed or not, and immediately replace it with acceptable material

3.2 INSTALLATION

- A. Manufacturer's Instruction: Follow the published instructions of the manufacturer for all items covered in this section
 1. Plug valves to be installed
 - a. With operating stem horizontal
 - b. Seat end facing direction as directed by Engineer
 - c. So plug will be in the top of the valve in the open position
- B. Follow the construction standards set forth in the Project Manual
 1. Set buried valves on compacted soil or precast concrete block
 2. Wood or other blocking will not be permitted for buried service
 3. Install with valve operator plumb and vertical
 4. Provide anchor ties or restraints where directed by Engineer, shown on the drawings or specified by Construction Standards

5. Provide compact mechanical joint restraint for installation of valves adjacent to fittings as shown on the Drawings or otherwise specified
 6. Provide valve operator extensions as specified to place operating nut at specified dimension from operating floor, surface or other access location
- C. Set valve boxes plumb and vertical, centered over the valve operator
1. Backfill valve prior to placing box to provide maximum soil cushion possible between bottom of valve box and valve body
 2. Construct concrete ring around valve box per the Drawings
- D. Support all exposed service valves, except gate or ball valves smaller than 3 inches, with cast-in-place concrete blocking and metal shims, or adjustable pipe supports of a size and strength capable of supporting the valve without any piping attachments
- E. Install all gaskets per manufacturer's recommendations and referenced standards
1. Torque bolts in accordance with standards and manufacturer's recommendations
- F. Confirm proper operation under all operating conditions

3.3 ADJUST AND CLEAN

- A. Clean
1. Remove all grease, dirt, excess paint, etc. from product surfaces prior to final acceptance
 2. Prepare exterior surface of exposed valves for application of final coatings in accordance with Section 09900
 - a. Confirm compatibility of field/finish and shop coatings
- B. Check and adjust valves and accessories for smooth operation in accordance with manufacturer's instructions
- C. Interface operation of valve actuators with local and remote operations and monitoring systems

3.4 FIELD QUALITY CONTROL

- A. Provide manufacturer's field service for all motor actuated valves
- B. Integrate valve operations with plant SCADA system and local operator and control devices and panels where required

END OF SECTION