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February 4, 2026

BARTON WATER SUPPLY CORPORATION
TWDB PUMP STATION #5 IMPROVEMENTS

Addendum No. 2

Attention is called to the following modifications to the referenced Plans, Specification and Contract Documents for the above referenced project. The Barton Water Supply Corporation (WSC) will receive sealed Bids for the Pump Station #5 Improvements project at the Barton WSC Offices, located at 101 Mt. Zion Rd., Gordon, Texas 76453, until 2:00 p.m., local time on **Tuesday, February 17, 2026**, at which time the sealed Bids received will be publicly opened and read. We hereby modify as follows:

DRAWINGS

1. **CLARIFICATION:** Sheet C-04 shows a 6-inch diameter outlet to pump suction. This shall be **REVISED** to show a 4-inch diameter outlet to pump suction to match Site Piping on Sheet C-02.

2. **CLARIFICATION:** Sheet C-04 shows approximate tank dimensions for a 30,000 gallon ground storage tank. Tank dimensions will be allowed to range up to 23' in height, if desired by the tank manufacturer.

TECHNICAL SPECIFICATIONS

1. **REPLACE** Specification Section 11306 – Packaged Pump Station, with the attached **REVISED** version of Specification Section 11306 – Packaged Pump Station.

2. **ADD** Orenco Composites to the list of **APPROVED** Manufacturers in Specification Section 13121 – Fiberglass Reinforced Plastic Building.

3. **REVISE** Specification Section 13122 – Pre-Engineered Metal Building, Item 2.8.A **FROM** requiring Hot-dip Galvanized framing members **TO** allow Manufacturers Primed Steel Coating for framing members.

4. **ADD** the attached Specification Section 13321 – Monitoring and Sensing Devices to the Technical Specifications.

5. **REVISE** Specification Section 13320 – Control Strategies Item 1.1.A.5 to state, "The flow control valve is solenoid controlled back pressure valve. It will be controlled via solenoid valve to open or close based on level of the ground storage tank, and maintain a minimum upstream pressure in the distribution system via valve settings.

6. **REPLACE** Specification Section 15114 – Miscellaneous Valves, with the attached **REVISED** version of Specification Section 15114 – Miscellaneous Valves.

This addendum consists of twenty-eight (28) pages and becomes a part of the referenced plans, specifications and contract documents and shall be acknowledged by the proposer and attached to the sealed proposal submitted.

By: Chris Hay, P.E. #111453
Project Manager

2/4/2026

SECTION 11306

PACKAGED PUMP STATION

PART 1 GENERAL

1.1 DESCRIPTION:

A. Purpose: To provide a single source responsible for the manufacturing and warranty of a prefabricated, skid mounted, fully automatic pumping system. The pumping system shall automatically maintain pressures in the hydropneumatic tank and the development distribution system piping.

B. The pumping system shall conform to the specifications herein in all aspects. This specification covers the minimum requirements but should not be considered to be all inclusive. It is the successful vendor's responsibility to include all necessary appurtenances to provide for a complete, smooth operating, and reliable pump system. The manufacturer shall supply a complete set of general arrangement drawings, electrical power schematics, and control schematics in the operation and maintenance manual.

C. Manufacturers seeking authorization to furnish their product shall be a registered ISO9001 manufacturer and shall hold a current Quality Management Certificate for the assembly of custom packaged pumping systems and controls for use in commercial, irrigation, municipal, industrial, and fire applications.

D. The pumping station skid shall be provided with equipment as described herein.

1.2 REFERENCES:

A. American National Standards Institute (ANSI).

B. American Society for Testing and Materials International (ASTM):

1. A36: Standard Specification for Carbon Structural Steel.

2. A48: Standard Specification for Gray Iron Castings.

3. A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

4. A105: Standard Specification for Carbon Steel Forgings for Piping Applications.

5. A276: Standard Specification for Stainless Steel Bars and Shapes.

6. A307: Carbon Steel Bolts and Studs.

7. A582/A582M: Standard Specification for Free-Machining Stainless Steel Bars.

8. B148: Standard Specification for Aluminum-Bronze Sand Castings.

C. American Society of Mechanical Engineers (ASME):

1. ASME B16.5: Pipe Flanges and Flanged Fittings.

D. American Water Works Association (AWWA).

E. American Petroleum Institute (API).

F. Hydraulic Institute (HI).

G. National Electric Code (NEC):

H. National Electrical Manufacturers Association NEMA – MG 1.

1.3 MANUFACTURER:

A. The pumping system shall be of the type manufactured by:

1. Xylem – AquaForce VS
2. Precision Pumping Systems (PPS) – Zone Industries
3. USEMCO – Global Pump Solutions
4. Engineer approved equal.

B. The pump station manufacturer shall be certified to provide a UL listing for both the control panel and the pump skid as a complete system. The primary line of business of the pump station manufacturer shall be the design & manufacture of pump booster skids. For consideration of a proposed equal system, the contractor shall furnish the following data to the Engineer at least 10 days prior to the date of the bid opening:

1. A complete specification for the pumping system proposed as an equal.

2. A statement of full conformance to the specifications signed by an authorized representative of the manufacturer.

3. A full-size layout drawing showing overall dimensions and all piping discharge locations.

4. Complete submittal data for all major equipment such as pumps, motors, control components, valves, and motor starters.

5. If, in the sole opinion of the Engineer, the alternative supplier is acceptable, the Engineer will add the supplier via addendum.

6. No requests for substitutions will be considered after the bid for this specification section.

1.4 SUMMARY:

Furnish and install an ETL Listed, NSF/ANSI/CA-61/372 Listed and Certified Variable Speed Duplex packaged water Booster System. The booster station shall be rated for a design flow of 150 GPM at 160 feet TDH with one pump in operation, and work in conjunction with level control from the ground storage tank, and pressure/level of the hydro tank and operation of the air compressor, as outlined in Section 13320 – Control Strategies.

1.5 QUALITY ASSURANCE:

A. All equipment under this section shall be furnished by a single supplier and shall be products in which the manufacturer regularly engages. The supplier shall have sole responsibility for proper functioning of the system and equipment supplied.

B. Equipment shall be a manufacturer's standard product presently in commercial production.

C. The manufacturer shall have in place a quality assurance program to assure the quality of the material furnished.

D. NIST Traceable test facility.

E. Package shall be manufactured in an ISO 9001 certified facility.

1.6 QUALIFICATIONS:

A. The manufacturer shall have a minimum of twenty years manufacturing and application experience.

B. Upon request from the engineer, the pump station manufacturer shall demonstrate proof of financial responsibility with respect to performance and delivery date.

C. Upon request from the engineer, the pump station manufacturer shall provide proof or evidence of facilities, equipment and skills required to produce the equipment specified herein.

1.7 SUBMITTALS & INSURANCE CERTIFICATIONS:

A. Submittals shall be in accordance with requirements of general specifications. Refer to Section 01300 for more information on submittals. All submittals must include the following:

1. Complete shop drawings and complete wiring diagrams. All drawings must be Inventor or AUTO-CAD electrical; complete with 3-D drawings available in Inventor, CAD, or Revit.

2. Provide written certification that manufacturers' pump system is NSF/ANSI-61 certified for potable drinking water.

3. Provide written certification that manufacturers' production facility is NSF/ANSI-61 certified to manufacture packaged pumping systems for potable drinking water.

4. Furnish written certification of the manufacturers listing with Underwriters Laboratories as an approved manufacturer of control panels.

5. Furnish written certification that the manufacturer is listed by UL/C-UL as an approved manufacturer of factory assembled pumping systems.

6. A complete, easily readable functional description of the proposed equipment.

7. Upon completion of the installation, the results of the field and acceptance tests as specified under this section of the specification shall be submitted to the engineer.

8. Furnished written certification from the manufacturers' representative of the proper installation of the station.

9. Provide written certification that, a nationally recognized manufacturer of package pump systems, manufactures the pump system. A corporate officer must sign this certification.

10. Provide written certification that pump system and pump system manufacturer are NSF/ANSI 61 certified for potable drinking water by a third party ANSI certifier.

11. Operation and maintenance manuals:

    Submit complete operations and maintenance information for this specific equipment. The engineer shall review these manuals for completeness. They shall include complete parts list including manufacturers' reference and ordering number, the local representative name, address and phone number, the model and serial number of the system.

PART 2 PRODUCTS

2.1 PUMPS AND MOTORS:

A. Pumps shall be cast iron, 304 stainless steel fitted, mechanical seal vertical multi stage type each coupled to a 3500 RPM, 208 Voltage, 1 Phase, 60 Hz, TEFC high efficiency motor. Pump No. 1 & 2 shall each provide 150 GPM at 160 ft TDH, 10 HP.

1. Goulds, series e-SV, Vertical Multistage Centrifugal Pump
2. Grundfos, series CR, Multi-Stage Vertical In-Line Pump
3. Engineer approved equal

2.2 VALVES:

A. Isolation Valves: Four (4) Individual pump suction and discharge valves shall be supplied. Valves shall be NSF 61 certified butterfly valve(s) with gear operators.

2.3 GAUGES:

A. Pressure Transmitters/Gauges: Provide two pressure transmitters with stainless steel case gauges, cocks, and copper sensing lines.

2.4 HEADERS AND BRANCHES:

A. 4" Type 304 stainless steel.

2.5 CONTROLS:

A. PF, VB Series, NEMA 1, UL/C-UL listed variable speed power and control panel system short circuit rating of 10ka RMS @ 600 VAC standard.

B. Allen Bradley, micro PLC controller with:

1. Flash main memory
2. SD memory for all user variables
3. Real time clock
4. Multi-level password security
5. 32 bit controller
6. MODBUS RTU, SMS, GPRS
7. USB programming port
8. RS-232, 485 Ethernet communication ports
9. 7" Color, touch screen HMI
10. PV-VB Self tuning pressure sequencing (ASHRAE 90.1 compliant)
11. Suction and system discharge pressure read out in PSI
12. Individual pump run indication
13. Hand-off-auto selection
14. Elapsed time meters
15. Automatic alternation
16. 100 event log
17. Low suction alarm with TDR delay
18. Low system alarm with TCR delay
19. High system alarm with TDR delay
20. High suction energy saving mode
21. 120V fused transformer
22. Two sets of auxiliary alarm contacts
23. Through the door control power disconnect
24. Two 4-20mA stainless steel pressure transducers, header mounted in suction and discharge.
25. Or Engineer approved equal.

(VFD'S WITH CIRCUIT PROTECTION DISCONNECT)

2.6 POWER:

A. Wiring. All wiring shall be in complete conformity with the National Electric Code and state and local and NEMA Electrical Standards.

1. All wiring shall be minimum 600 volt UL type MTW or AWM and have a current-carrying capacity of not less than 125% of the full load current. The conductors shall be in complete conformity with the national electric codes, state, local and NEMA electrical standards. For ease of servicing and maintenance, all wiring shall be color coded. The wire color code shall be clearly shown on the drawings, with each wire's color indicated.

2. All control wiring shall be contained within plastic/PVC wiring duct with covers. Where dimensional constraints prevent the use of wiring duct, wires shall be trained to panel components in groupings. The wire groupings shall be bundled and tied not less than every 3 inches with nylon self-locking cable ties as manufactured by Panduit or equal.

3. Every other cable tie shall be fastened to the enclosure door or inner device panel with a cable tie mounting plate with pressure tape. Where wiring crosses hinged areas such as when trained from the inner device panel to the enclosure door, spiral wrap shall be used.

B. Name Plates:

1. Provide permanently attached nameplate to clearly indicate the purpose and operation of the panel and all control devices.

a. Nameplates attached to the exterior of the control panel door or interior panel shall be engraved nameplates constructed from laminated phenolic plastic, at least 1/16" thick, 3-ply, with black surfaces and white core. Engraving shall be condensed gothic, at least ¼" high, appropriately spaced. Nameplates shall be attached with stainless steel, self-tapping screws.

b. Nameplates or diagrams attached to the back side of panel fronts may be thermal transfer laminated tape and shall be attached with water-proof adhesive that is heat-resistant up to 250° degrees Fahrenheit.

2. All devices shall be identified on the front and back of the applicable panel door or interior panel.

C. Motors shall be controlled and protected using VFDs. Refer to electrical drawings and specifications for VFD sizing and information.

D. Auxiliary Devices:

1. All devices shall be mounted on the front of the enclosure. NO devices shall be mounted on the sides of the enclosure. Devices mounted on the enclosure shall have the same NEMA rating as the enclosure.

2. Pushbuttons shall be of the heavy-duty oiltight type, mounted on the front of the starter enclosure.

3. Selector switches shall be of heavy duty, oiltight type, mounted on the starter cover.

4. The operator button shall be molded Bakelite and solid in color throughout the material. Painted buttons are not acceptable. A suitable and clearly legible nameplate shall be provided for each button to designate its function.

5. All contact blocks shall be made of molded, high arc resistant material and shall have a minimum of one normally open, and one normally closed contact, with a continuous current rating of 10 amperes, 600 volts. All terminals shall be readily accessible, contact blocks shall be easily changed, or be arranged for the addition of contacts.

6. Pilot lights shall be an integral part of control station when indicated. Indicating lights shall be push to test LED type, rated for the enclosure. Contractor shall install pushbuttons and selector switches not factory mounted.

E. Loop Isolators:

Design and fabrication:

1. Solid state electronics.
2. Transmit analog output signal directly proportional to measured input signal.
3. Power source: 24 VDC.
4. Analog input: 4-20 mA DC or 1-5 VDC.
5. Output signal: 4-20 mA DC into 1400 ohms.
6. Impedance:

    a. Voltage input: 10 Meg.
    b. Current input: 50 ohms.
    c. Voltage output: 1 ohm.
    d. Current output: 1650 ohms.
    e. Accuracy: Better than ± 0.10 percent of span.
    f. Isolation: Up to 500 V rms (input, output and case).
    g. Accuracy: Better than ± 0.10 percent of span.
    h. Isolation: Up to 500 V rms (input, output and case).
    i. Temperature effect: ±0.0025 percent of span per Degree F.
    j. Ambient temperature range: 0-140 Degree F.
    k. Factory calibrated.

PART 3 EXECUTION

3.1 FACTORY FABRICATION:

A. Provide each system as a complete package system on an open structural steel mounting frame, piped, tubed, mounted and wired. Unit shall be factory primed and painted with machine grade finish coat. All welding shall be performed by ASME Section 9 certified welders. System manufacturer shall isolate all ferrous from all non-ferrous materials.

3.2 FACTORY TEST:

A. The package shall be electrically and hydrostatically tested before shipment, in addition, each system shall be factory tested from 0-100% of flow and pressure. NIST traceable test.

3.3 SITE COMMISSIONING AND TRAINING:

A. The factory authorized local representative shall provide 2 days (8 hours each day) of startup and field training.

3.4 WARRANTY:

A. The packaged pump station supplier shall warrant the equipment listed in this spec for a period of twelve (12) months commencing upon Owner-accepted substantial completion.

B. The pump manufacturer shall provide a three (3) year warranty commencing upon Owner-accepted substantial completion. This warranty shall be independent from overall pump station warranty.

END OF SECTION

SECTION 13321

MONITORING AND SENSING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Magmeter, magnetic liquid level gauges, radar level indicators, pressure gauges, pressure analyzer, level analyzer, and pressure switches.

1.2 RELATED SECTIONS:

Not used.

1.3 SUBMITTALS:

A. In accordance with Section 01300, submit complete descriptive literature for each component.

PART 2 PRODUCTS

2.1 MAGNETIC FLOW METERS:

A. Acceptable manufacturers:

1. Endress Hauser Promag W 400.
2. Or Engineer Approved Equal.

B. Design and fabrication:

1. Meter shall be a velocity sensing electromagnetic type flanged tube meter with sealed housing. Design code shall be for fixed flange, 0xDN inlet/outlet runs. Meter, digital totalizator, transmitter, and all related appurtenances shall be IP68 rated. Housing shall be remote, aluminum coated.

2. Meter Tube: AWWA Class D steel flanges rated for 150 psig. Tube shall be 316 SS and lined with NSF 61 approved hard rubber liner. Electrodes shall be constructed of 316 SS.

3. Meter shall include a digital indicating transmitter and be equipped with a 9-digit digital totalizer reading in units of MG. Digital totalizer shall be installed to be easily readable. If the Meter is installed within either a trench or vault, the digital totalizer shall be wall or remote mounted.

4. Mag Shield shall be welded to the tube providing a completely sealed environment for all coils, electrode connections and wiring harness capable of NEMA 6P/IP68 operation.

5. The meter assembly shall operate within a range of 0.2 ft/s to 10 ft/s.

6. Operating pressure:

   a. Maximum of 300 psi.

7. Process temperature range: 35°F to 100°F. Ambient temperature range: 10°F to 120°F

8. Grounding requirements: 316 SS grounding rings shall be supplied with meter tube.

9. Accuracy:

   a. Accuracy: ±0.5% of actual flow.
   b. Repeatability: ±0.1%.

10. 4-20 mA DC isolated output, suitable for proportional output of flow measurement to PLC.

11. Power supply 100-240VAC/60 Hz or 10 -35VDC.

12. Magmeter shall be installed in pump station building with transmitter in sealed IP67 rated enclosure attached to wall inside of building. Sensor cable shall be adequate for distance from sensor to transmitter.

13. Transmitter electronics shall use microprocessor based architecture and be configured using parameters. Device shall include four separate digital programmable outputs.

14. Provide configuration / diagnostic tool.

Schedule of Flow Meters		
TAG NUMBER	SERVICE	SPAN
MM-101	System Supply to Ground Storage Tank	0 – 150 gpm
MM-201	High Service Pump Station to Distribution	0 – 500 gpm

2.2 MAGNETIC LIQUID LEVEL GAUGE, INDICATOR, AND TRANSMITTER (LE/LIT):

A. Acceptable Manufacturers:

1. Magnatrol - Model Aurora gauge and Eclipse guided radar transmitter - primary indicator and secondary probe chambers included with assembly.

2. Or Engineer Approved Equal.

B. Primary chamber components at minimum shall include:

1. Standpipe, independent of secondary chamber.

2. Tank Connections – flanged.
3. Clamps.
4. High Visibility Shuttle/Follower Indicator.
5. Indicator Scale – decimal feet.
6. Magnetic Float.

C. Material Specifications:

1. Float/Standpipes: 316/316L Stainless Steel, Schedule 10 rated to 1270-psi (ANSI Pressure Class 900) at a minimum 100°F.
2. Float specific gravity: 0.47 (minimum).
3. Standpipe lengths: 60-inches (minimum).
4. Probe: 316/316L Stainless Steel.
5. All materials shall be NSF-61 rated and fit for public consumption.

D. Design and Fabrication:

1. Unaffected by material build-up on probe.

2. Compatible with bulk density of process material - water.

3. Standpipes temperature ratings shall be between -325°F and 750°F.

4. Minimum probe and electronics temperature rating shall be between -40ºF and 160ºF.

5. Transmitter shall operate on 120-VAC, 60-Hz.

6. Transmitter shall include 4 to 20-mA outputs, with HART protocol and field bus.

7. Transmitter shall include setpoints for a high-level alarm (HLA) and low-level alarm (LLA) at minimum.

E. Mount level gauge, indicator, and transmitter to wall inside pump station building. Use ductile iron pipe (DIP), fittings and accessories for supply and return piping. Refer to Contract Drawings for details.

F. Schedule

Schedule of Level Transmitters for Water Service		
TAG NUMBER	SERVICE	SPAN
LIT-102	Clean Filtered Water and Air – Hydro-pneumatic Tank	Proposed Tank Height

2.3 RADAR LEVEL INDICATING TRANSMITTERS (LIT):

A. Acceptable Manufacturers:

1. Endress+Hauser Level Sensor Micropilot FMR20 Radar element, Level Indicating Transmitter RIA15
2. Or Engineer Approved Equal

B. Materials:

1. Sensor with (In Contact with Process): Polyvinylidene Fluoride
2. Counter nut (In Contact with Process): Polyvinylidene Fluoride
3. Matching Layer (In Contact with Process): Polybutylene terephthalate
4. Transparent Cover: Polyamide Nylon
5. Housing: Polybutylene terephthalate
6. Sealing and O-Rings: EPDM
7. Ground Terminals: Stainless steel
8. All materials shall be NSF-61 rated and fit for public consumption.

C. Design and fabrication:

1. Time-of-flight radar level transmitter with temperature correction sensor.

2. Linearization function (up to 32 points) for conversion of the measured value into unit of feet.

3. 2-wire, 14-35V supply voltage (3.6-22 mA)

4. For LIT instruments, include 4-line LCD display with configuration via 3 keys directly at the instrument. Measured depth shall be shown on display in units of feet.

5. 2″ MNPT process connection with stainless steel 2″ FNPT mating flange or wall bracket as required for application. Each unit shall be supplied with weather protection cover.

6. Enclosure rating IP68 (NEMA 6P).

7. Output: 4-20 mA DC proportional to level measurement. Output damping freely selectable between 0 and 255 seconds. Current output signal on error selectable option.

8. Blocking distance of less than 1.5 ft with max fluid measuring span of 26 ft and emitting angle of 11 degrees.

9. The unit shall be rated for ambient/process temperature of -4°F to 140°F.

10. Maximum measuring error of +/- 0.2%.

D. Schedule

Schedule of Level Transmitters for Water Service		
TAG NUMBER	SERVICE	SPAN
LIT-101	Clean Filtered Water and Air –GST	Proposed Tank Height

2.4 PRESSURE GAUGES:

A. Acceptable manufacturers:

1. Ashcroft.
2. Ametek.
3. Rosemount.
4. Engineer Approved Equal.

B. Materials:

1. Bourdon tube, socket, connecting tube: 316 stainless steel.
2. Case: Phenolic.
3. Diaphragm seal housing: 316 stainless steel or PVDF/PVC.
4. Pressure snubber:

    a. Filter disc: 316 stainless steel.
    b. Housing: 316 stainless steel.

C. Accessories:

1. Provide 316 SS diaphragm seals for High Service Pumps.

2. Provide stainless steel ball valve at point of connection to equipment and at panel if panel mounted.

3. Utilize pressure snubbers with porous metal discs to provide pulsation dampening on high service pump gauge applications.

4. Provide 1/2 IN stainless steel antisiphon pigtail inlet connection for hot water and steam applications.

D. Design and fabrication:

1. All components suitable for service at:

    a. 250 Deg F.
    b. The maximum process temperature to which the gauge is to be exposed.

2. Provide viewer protection from element rupture.

3. Calibrate gauges at jobsite for pressure and temperature in accordance with manufacturer's instructions.

4. 4-1/2" Dial Size

5. Unless otherwise required by codes, provide stem mounted:

6. Equip with white faces, black numerals and black pointers.

7. Gauge tapping position to be clear of equipment functions and movements, and protected from maintenance and operation of equipment. Gauge to be readable from an accessible standing position.

8. Gauge accuracy: 1 percent of full range.

9. Select gauge range so that:

   a. The normal operating value is in the middle third of the dial.
   b. Maximum operating pressure does not exceed 75 percent of the full-scale range.

2.5 PRESSURE INDICATING TRANSMITTERS:

A. Acceptable manufacturers:

1. Endress & Hauser Cerabar S PMP71
2. Or Engineer Approved Equal

B. Materials:

1. Isolating diaphragm: 316 stainless steel.
2. Process adapter: 316 stainless steel ½" MNPT.
3. Housing: Aluminum.
4. Fill fluid: Silicone

C. Design and fabrication:

1. 2-wire, piezoresistive pressure transmitter with integrally mounted 4-line LCD scaled in units of psig.

2. Static pressure limit at least 1.5 times the nominal pressure range.

3. Smart transmitter utilizing microprocessor based electronics and self-diagnostic capability. The transmitter shall be programmable via Hall magnetic switch external pushbuttons without pressure source or hand held device.

4. Output: 4-20 mA DC proportional to pressure measurement with HART protocol.

5. Unit shall use DC loop-power supply 10.5 to 45 VDC with self-diagnostic capability and a non-volatile memory.

6. Adjustable zero and span.

7. The unit shall be rated for process temperature inclusive of 35°F to 100°F and an ambient environment of 10 degrees F to 120 degrees F.

8. Damping: Adjustable between 0 and 60 seconds.

9. Reference accuracy shall be +/- .075% of calibrated span including non-linearity hysteresis and non-reproducibility in accordance with IEC 60770. Total performance accuracy including non-linearity hysteresis and non-reproducibility in addition to thermal change of the zero point shall be +/- .2% URL.

Schedule of Pressure Transmitters for Water Service (PE/PIT)		
TAG NUMBER	SERVICE	SPAN
PIT-101	Air Line to Hydropneumatic Tank	0-150 psig

2.6 PRESSURE SWITCHES:

A. Acceptable manufacturers:

1. Ashcroft B-Series
2. Or Engineer Approved Equal

B. Materials:

1. Diaphragm: 316 stainless steel.
2. Process adapter: 316 stainless steel ½" MNPT.
3. Housing: Aluminum.

C. Design and fabrication:

1. Diaphragm piston actuator type.
2. Switch shall be field adjustable.
3. Enclosure rating shall be NEMA 4X IP66.
4. Electrical output shall SPDT.
5. Electrical termination shall be ¾" FNPT.

2.7 PIPE, TUBING, AND FITTINGS:

A. Acceptable Manufacturers:

1. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

a. Tube fittings:

i. Parker CPI.
ii. Swagelok.
iii. Engineer Approved Equal.

B. Instrument Tubing and Fittings:

1. Material:

a. Tubing: ASTM A269, Grade TP 316 stainless steel.
b. Straight fittings: 316 stainless steel per ASME SA-479 or ASTM A276.
c. Shaped bodies: ASME SA-182 F316 stainless steel.

2. Design and fabrication:

a. Tubing:

i. Seamless.
ii. Fully annealed.
iii. Maximum hardness: 80 Rb.
iv. Free from surface scratches and imperfections.
v. Diameter: 1/2 IN OD unless specified otherwise.
vi. Wall thickness:

- Meet requirements of paragraph 122.3 of ASME B31.1.
- Minimum 0.049 IN for 1/2 IN OD tubing.

b. Fittings:

i. Flareless.
ii. Compression type.

C. Instrument Piping:

1. For applications where the instrument is supported solely by the sensing line, (e.g. pressure gauge directly mounted to process line) utilize piping as specified below.

a. Diameter: 1/2 IN unless specified otherwise.
b. Schedule 80.
c. 316 stainless steel.

2.8 INSTRUMENT VALVES:

A. Process instrument multi-valve manifolds, isolation, vent and blow-down valves:

1. Acceptable manufacturers:

a. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

i. Whitey Co.
ii. Anderson-Greenwood USA, Inc.
iii. Engineer Approved Equal.

2. Materials:

a. Packing:

i. 450 DegF and above: Graphite.
ii. Below 450 DegF: Graphite or Teflon.

b. Body: 316 stainless steel per ASTM A479.

c. Stem: 316 stainless steel per ASTM A276.
d. Ball: 316 stainless steel per ASTM A276.
e. Support rings: 316 stainless steel per ASTM A276.
f. Seats:

i. Metal:

- 316 stainless steel per ASTM A276.

ii. Soft:

- Teflon, Delrin, or equivalent.
- Only utilized on applications where manufacturer's temperature and pressure ratings exceed process design conditions.

3. Design and fabrication:

a. Either of the following:

i. Ball valve with 1/4 turn activation.
ii. Free-swiveling ball stem.

b. Provide body wall thickness sufficient for process design conditions per ASME B31.1.

c. Temperature: Manufacturer's temperature rating for all components shall exceed process design conditions.

B. Isolation Valves in Copper Instrument Air Tubing:

1. Acceptable manufacturers:

a. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

i. Whitey Co.
ii. Or equal.

2. Materials:

a. Packing: Graphite or Teflon.
b. Body: Brass per ASTM B16.
c. Stem: 316 stainless steel per ASTM A276.
d. Ball: 316 stainless steel per ASTM A276.
e. Support rings: 316 stainless steel per ASTM A276.
f. Seats:

i. Metal:

- 316 stainless steel per ASTM A276.

ii. Soft:

- Teflon, Delrin, or equivalent.
- Only utilized on applications where manufacturer's temperature and pressure ratings exceed process design conditions.

3. Design and fabrication:

a. Ball valve with 1/4 turn activation.
b. Provide body wall thickness sufficient for process design conditions per ASME B31.1.

2.9 ACCESSORIES:

A. Furnish all mounting brackets, hardware and appurtenances required for mounting primary elements and transmitters.

1. Materials, unless otherwise specified, shall be as follows:

a. Bolts, nuts, washers, expansion anchors: 316 stainless steel.
b. Mounting brackets:

i. Standard: 316 stainless steel.
ii. Highly corrosive areas: Aluminum.

c. Mounting plates, angles:

i. Standard: Carbon steel.
ii. Corrosive areas: 316 Stainless steel.

d. Instrument pipe stands:

i. Standard: Hot-dip galvanized 2 IN schedule 40, ASTM A106, Grade B carbon steel.
ii. Corrosive areas: 316 stainless steel.

B. Tubing Support Angles and Brackets

1. Any of the following materials are acceptable:

a. Aluminum support with dielectric material between support and tubing.
b. Type 316 stainless steel.
c. Fiberglass.

C. Tubing Tray or Channel: Aluminum

1. Provide dielectric material between tray or channel and tubing.

D. Provide handheld communicator compatible with all intelligent transmitters furnished. Handheld communicator shall provide capability to check calibration, change transmitter range, and provide diagnostics. If these features are provided with the intelligent transmitter, the handheld communicator is not required.

E. Cable lengths between sensors and transmitters shall be continuous (without splices) and as required to accommodate locations as shown on Drawings.

PART 3 EXECUTION

3.1 INSTALLATION:

A. Install products in accordance with manufacturer's instructions.

B. Install instrument mounting pipe stands level and plumb.

C. Instrument Valves:

1. Orient stems for proper operation.

2. Install arrays orderly and neat in appearance with true horizontal and vertical lines.

3. Provide a minimum of 2 IN clearance between valve handle turning radii where there are multiple valve handles appearing in a straight line.

4. Valves shall have bonnets and any soft seals removed during welding or soldering into the line. When cool, reassemble the valves.

5. Support each valve individually. The tubing system does not qualify as support for the valve.

D. Locate instrument piping and tubing so as to be free of vibration and interference with other piping, conduit, or equipment.

E. Keep foreign matter out of the system.

F. Remove all oil on piping and tubing with solvent before piping and tubing installation.

G. Plug all open ends and connections to keep out contaminants.

H. Tubing Installation:

1. General:

a. Install such that tube shows no sign of crumpling, bends of too short a radius, or flattening, etc.

b. Make tube runs straight and parallel or perpendicular to the floor, equipment and piping runs.

c. For liquid and steam applications, slope continuously from the process to the instrument with a minimum slope of 0.50 IN per foot.

d. For gas and air applications, slope continuously from the instrument to the process with a minimum slope of 0.50 IN per foot.

e. If the sensing line cannot be continuously sloped, install high point vents and low point drains.

f. Keep instrument tubing clean during all phases of work.

g. Blow out with clean, dry, oil-free air immediately before final assembly.

h. Cut by sawing only and debur.

2. Bending:

a. Make each bend with tube bender of the correct size for the tube.

b. Make all bends smooth and continuous.

c. Rebending is not permitted.

d. Make bends true to angle and radius.

e. Maintain a true circular cross section of tubing without buckling or undue stretch of tube wall.

f. Allowable tolerance for flattening out of tubing bends: Maximum of 8 percent of the OD for stainless steel tubing.

g. Minimum bending radius for stainless steel tubing:

TUBE OD INCHES	MINIMUM BENDING RADIUS, INCHES
1/4	9/16
3/8	15/16
1/2	1-1/2

h. Minimum bending radius for type L, hard (drawn) copper.

TUBE OD INCHES	MINIMUM BENDING
3/8	1-3/4
1/2	2-1/2

3. Tubing support:

    a. Intermittently support by clamping to support angle.

    b. Install supports to be self-draining, supported by hangers, or cantilevered from walls or structural beams.

    c. Support at 5 FT-0 IN maximum spans for horizontal or vertical runs.

    d. Use tubing trays in areas where spans between supports are greater than 5 FT and for all signal tubing support.

    e. Support each tubing tray at 10 FT maximum spans.

    f. Align tubing in orderly rows and retain in the tray by bolted clips. The use of spring or speed clips is not acceptable.

    g. Maintain order of the tubing throughout the length of the tray.

    h. Locate angle, channel and tray installation to protect tubing from spills and mechanical damage.

    i. Locate support members to clear all piping, conduit, equipment, hatchways, monorails, and personnel access ways and allow access for equipment operation and maintenance.

    j. Support trays to prevent torsion, sway or sag.

    k. Permanently attach supports to building steel or other permanent structural members.

    l. Arrange supports and trays so that they do not become a trough or trap.

4. Routing and orientation:

    a. Route to maintain a minimum headroom clearance of 8 FT.

    b. Locate and orient valves and specialties so that they are accessible for operation and maintenance from the operating floor. Do not route through or over equipment removal areas, below monorails or cranes nor above or below hatches.

5. Expansion and vibration provisions:

    a. Provide horizontal expansion loops at the process connections.

b. Route tubing parallel to relative motion through sleeved supports that allow linear tube movement.

c. Cold springing of tubing to compensate for thermal expansion is prohibited.

d. Utilize flexible hoses to connect pneumatic tubing to air users which may move or vibrate.

I. Air Supply:

1. Connect all instruments requiring air to air supply piping and tubing. Provide connections as follows:

a. Terminate branch supply line not more than 36 IN from the device with a 1/2 IN isolation valve.

b. For remaining line, use 1/4 or 3/8 IN tubing of a length to allow for normal equipment movement and vibration.

c. Use flexible hoses to connect pneumatic tubing to air users which may experience significant movement or vibration.

d. Make branch connections to individual instruments from the top of the supply header.

e. Purge instrument air piping of extraneous material by blowing clean, dry, oil-free air through the system prior to final connection.

J. Threaded Connection Seals:

1. Use Tite-Seal or acceptable alternate.
2. Use of lead base pipe dope or Teflon tape is not acceptable.
3. Do not apply Tite-Seal to tubing threads of compression fittings.

K. Capillary Tubing:

1. Route capillary tubing in tubing tray.

2. Install capillary tubing with a 2 IN minimum bend radius which does not kink or pinch the capillaries.

3. Do not cut or disconnect at any point.

4. Coil excess capillary tubing and secure at the instrument.

L. Instrument Mounting:

1. Mount all instruments where they will be accessible from fixed ladders, platforms, or grade.

2. Mount all local indicating instruments with face forward toward the normal operating area, within reading distance, and in the line of sight.

3. Mount instruments level, plumb, and support rigidly.

4. Mount to provide:

   a. Protection from heat, shock, and vibrations.
   b. Accessibility for maintenance.
   c. Freedom from interference with piping, conduit and equipment.

3.2 DEVICE OPERATION:

Demonstrate device operation and calibration in conjunction with overall instrumentation system testing, checkout, and operator training.

END OF SECTION

SECTION 15114

MISCELLANEOUS VALVES

PART 1 GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Automatic control valves:

a. Flow Control Valves.

B. Related Sections:

1. Division 01 - General Requirements.
2. Section 11005 “Equipment: Basic Requirements”.
3. Section 15100 “Valves: Basic Requirements”.

1.2 QUALITY ASSURANCE:

A. Referenced Standards:

1. American Gas Association (AGA).

2. American Society of Mechanical Engineers (ASME):

a. B16.1, Cast Iron Pipe Flanges and Flanged Fittings - Classes 25, 125 and 250.

3. American Water Works Association (AWWA):

a. C512, Standard for Air-Release, Air-Vacuum, and Combination Air Valves for Waterworks Service.

b. C550, Standard for Protective Interior Coatings for Valves and Hydrants.

4. National Electrical Manufacturers Association (NEMA):

a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SUBMITTALS:

A. Submit under provisions of Division 01.

B. The following submittals are required, at a minimum:

1. Shop Drawings: See Specification Section 15100.
2. Operation and Maintenance Manuals:

a. See Division 01 for requirements for the contents of Operation and Maintenance Manuals.

C. Include any other information necessary for the ENGINEER to determine compliance with the specifications.

D. All deviations from Contract Documents shall be clearly identified and approved in writing by the ENGINEER.

E. Partial or incomplete submittals will not be reviewed by ENGINEER.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable articles below are acceptable, or Engineer approved equal.

B. Submit request for substitution in accordance with Division 01.

2.2 AUTOMATIC CONTROL VALVES:

A. Flow Control Valve – Back Pressure Sustaining with Solenoid Shutoff:

1. Acceptable manufacturers:

a. Cla-Val, 58-01BPKCKO-1 Combination Back Pressure and Solenoid Shut Off Valve with X43H Strainer Attached.
b. Or Engineer-approved equal.

2. Design requirements: Modulate valve to ensure a minimum of 35 pounds per square inch of upstream pressure and provide solenoid control to intercept the operation of the differential control and close the main valve based off ground storage tank levels.

3. Solenoid: Shall be “energize to open” with manual operator feature.

B. Design requirements:

1. Size: 2 inch diameter.
2. 0 – 75 psi adjustment range.
3. Assemble all control features and hardware on basic valve at factory.
4. Use stainless steel for all exposed portions of the control.
5. Include with valve control:

a. Stop valves.
b. Strainer.
c. Valves for opening and closing speed control.
d. Pilot valves.
e. Solenoid valves.
f. Switches as necessary to provide control function.

2.3 ACCESSORIES:

A. Furnish any accessories required to provide a completely operable valve.

B. Install as shown on Drawings.

2.4 FABRICATION:

A. Completely shop assemble unit including any interconnecting piping, speed control valves, control isolation valves and electrical components.

B. Provide internal epoxy coating suitable for potable water for all iron body valves in accordance with AWWA C550, or Engineer approved equal.

2.5 SOURCE QUALITY CONTROL:

A. Shop hydrostatically test to piping system test pressure.

2.6 MAINTENANCE MATERIALS:

A. Provide one (1) set of any special tools or wrenches required for operation or maintenance for each type valve.

PART 3 EXECUTION

3.1 INSTALLATION:

A. See Specification Sections 15100.

3.2 FIELD QUALITY CONTROL:

A. Clean, inspect, and operate valve to ensure all parts are operable and valve seats properly.

B. Check and adjust valves and accessories in accordance with manufacturer's instructions and place into operation.

END OF SECTION