Date Issued: February 9, 2016 Bid No.: 16-020

The City of Decatur will accept sealed bids for the following material, equipment or services for City Departments:

Description: Non-Corrosive Horizontal Fluid Filtration Tanks

Bids must be received before 2:00pm on February 24, 2016.

Include 1 original and 1 copy of your bid submission.

Bid opening will be held on 3rd floor, Purchasing Department, Decatur City Hall 402 Lee Street

Return sealed bid to:

Regular Mail
City of Decatur
Purchasing Department
P.O. Box 488
Decatur, AL 35602

Courier
City of Decatur
Purchasing Department
Third Floor
402 Lee St., NE
Decatur, AL 35601

I/We agree to furnish at the prices shown and guarantee that each item offered will meet or exceed all specifications, terms and conditions, and requirements listed. I herein affirm I have not been in any agreement or collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding or otherwise. I have read and understand all terms and conditions of this bid.

_____ _____
Company Name Authorized Signature

_____ _____
Mailing Address Typed/Printed Authorized Name

_____ _____
City, State, Zip Title

_____ _____
Email Telephone

PRICE SHEET Opening Date: February 24, 2016

Invitation to Bid No.:16-020 Opening Time: 2:00pm

Prices quoted in all bids for personal property shall be total delivered price.

LINE NO.	ITEM	Units	COST PER ITEM	TOTAL
1	Non-Corrosive Horizontal Fluid Filtration Tank	11		$

- A bid bond **is not** required for this bid.
- Delivery can be made _____ days or _____ weeks after receipt of order.
- Terms: _____ (Discounts will be considered in the bid evaluation and will be taken without regard to date of payment.)
- Prices valid for acceptance within _____ days (not to be less than 90 days)
- Contracts for services are let for a period of one year and may be renewed for up to two additional years, provided the terms of the contract do not materially change.

NOTE: FOR THIS BID TO BE CONSIDERED RESPONSIVE, ALL INFORMATION REQUESTED SHOULD BE SUPPLIED, AS APPROPRIATE OR THE ENTIRE BID MAY BE DISQUALIFIED. BID RESPONSE MUST BE IN INK OR TYPED WITH THE ORIGINAL SIGNATURE INCLUDED.

_____ _____

Bidder Signature Company

STANDARD TERMS AND CONDITIONS

IN ORDER TO SUBMIT A RESPONSIVE BID, IT IS VERY IMPORTANT THAT ALL TERMS AND CONDITIONS, SPECIFICATIONS AND INSTRUCTIONS ARE READ THOROUGHLY.

Bid response envelopes shall be properly identified on the front with the invitation to bid number, opening date and time. Each individual invitation to bid shall be submitted in a separate sealed envelope. Multiple bid responses submitted in the same envelope/courier package (that are not in separate envelopes properly identified) shall be rejected. The Purchasing Department assumes no responsibility for late bid responses that occur due to the U.S. Postal Service or private courier service.

Bid responses and signature page must be submitted on this form in ink or typewritten or the bid will be rejected. Submit this **original and (1) copy** of the original with your response.

For a "no-bid" response, return the signature page signed and marked "no bid". Non-response may result in removal from active bidders list.

The attached specifications are being provided to potential bidders as guidelines that describe the type and quality of equipment, supply, and/or service the City of Decatur is seeking to purchase. The bidder must indicate compliance or list exceptions to each specification item for consideration. Failure to comply with this provision could be cause for rejection of the bid.

Bid responses must be received in the office of the Purchasing Department not later than the date and time specified.

The Purchasing Department will not accept facsimile (fax) nor email transmissions of bids.

Changes or modifications of this Invitation to Bid are allowed only by written authority of the Purchasing Agent.

Non Appropriation of Funds: Continuation of any agreement between the City of Decatur and a bidder beyond a fiscal year is contingent upon continued legislative appropriation of funds for the purpose of this bid and any resulting agreement. Non availability of funds at any time shall cause any agreement to become void and unenforceable and no liquidated damages shall accrue to the City as a result. The City will not incur liability beyond the payment of accrued agreement payment.

Descriptive Literature: Reference to brand names and numbers is not restrictive, unless otherwise specified. Bids on equivalent items meeting the standards of quality indicated will be considered, providing the bid clearly describes the item offered and indicates how it differs from the referenced brands. Descriptive literature on any supplemental information necessary for comparison purposes shall be submitted with the bid or the Purchasing Agent may reject the bid for that item. Reference to literature submitted with a previous bid, or on file with the Purchasing Department will not satisfy this requirement.

The City of Decatur reserves the right to modify all or any portion of this Invitation to Bid when the best interest of the City is involved. The City reserves the right to award this bid to a single vendor or multiple vendors when in the best interest of the City.

The City of Decatur reserves the right to seek clarification of bid responses from vendors submitting responses.

The City of Decatur is exempt from all Federal, sales and use taxes.

All bidders shall maintain such insurance as will protect bidder and the City of Decatur from claims under Workman's Compensation Acts and from claims for damage and or personal injury, including

death, which may arise from the operation and/or fulfillment of the resulting contract of this Invitation to Bid. Insurance shall be written by companies authorized to do business in Decatur, Alabama. Evidence of insurance shall be furnished to the City of Decatur Purchasing Department with submitted bids when requested.

Any individual, company, or corporation doing business with the City of Decatur must possess and show proof thereof all proper licenses and/or proper certifications required by Federal, state and local statutes and regulations prior to award when requested.

The City of Decatur reserves the right to terminate any contract resulting from this bid for just and reasonable cause whereby it appears to be in the best interest of the City.

The successful bidder agrees, by entering into this contract, to defend, indemnify, and hold the City of Decatur harmless from any and all causes of action or claims of damages arising out of or related to bidder's performance under this contract.

The successful bidder shall abide by all Federal, State, and Local Statutes, laws, regulations, and ordinances. Including but not limited to a current business license and remittance of sales tax owed to the City.

An electronic version of this bid is available on the City's website at www.decaturalabamausa.com or by emailing purchasing@decatur-al.gov. In order to decrease the evaluation time and insure award by the award date please enter your responses in the electronic version if possible, and return it with a hard copy with your bid response package.

The hard copy of the invitation to bid on file in the City of Decatur Purchasing office shall serve as the master document. Any alterations, deletions, additions or other changes that materially change the intent of the bid could be considered grounds for rejection of the bid response.

Exclusion of the electronic files in a bid response is not a basis for rejection.

A BID RESPONSE MAY BE REJECTED IF:

- Bids improperly submitted or identified
- Bid not signed or not original signature
- Requested information, or documentation not submitted with bid
- Failure to acknowledge receipt of addendum with bid
- Material alteration of the master document
- Invitation to bid number not on face of envelope
- Received late
- Bid response not on original form
- Bid not in ink or typed
- Proper licensing not included/provided as required by law

Notice: As a condition of contract, grant or incentive performance with the City of Decatur, compliance with the requirements of the Beason-Hammon Alabama Taxpayer and Citizen Protection Act must be provided. Please enter the name of your company and your name and complete the affidavit below. Your signature must be notarized.

BUSINESS NAME: _____
APPLICANT'S NAME: _____

E-VERIFY AFFIDAVIT

I am the applicant listed above. In my capacity as _____ of the business entity listed above, I do hereby execute this affidavit on behalf of the business listed above and, by executing this affidavit, I verify that business' compliance with Section 31-13-9 of the Code of Alabama, 1975, stating affirmatively that it does not knowingly employ, hire for employment or continue to employ an unauthorized alien. Further, the business has registered with and is participating and will participate during the performance of any contract with the City in the federal work authorization program known as "E-verify" web address https://e-verify.uscis.gov/enroll , operated by the United States Citizenship and Immigration Service Bureau of the United States Department of Homeland Security to verify information of newly hired employees pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P. L. 99-603, in accordance with the applicable provisions of Alabama's Immigration law.

The undersigned further represents that, should the business employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to the contract with the City, it will secure from such subcontractor(s) verification of compliance with Section 31-13-9 of the Code of Alabama, 1975, in a form substantially similar to this affidavit. The Business further agrees to maintain records of such compliance and provide a copy of each said verification on request of the City.

_____
E-verify Employment Eligibility Verification User Identification Number

_____
Applicant

Sworn to and subscribed before me on this the _____ day of _____, 20_____

_____
Notary Public

My Commission Expires: _____

Bid Document Checklist

Items Required with Bid	Submission Requirements Check Sheet X = REQUIRED; BLANK=NOT REQUIRED	Items Submitted (Bidders Initials)
X	Envelope Sealed and Marked w/bid # on front	
X	Original Signatures on front page (in ink)	
	Bid Bond or Check	
	Addendum	
X	E-Verify form	
	Proof of Insurance	
X	Price Sheet Information Included	
	References	
	Catalog	
X	Send in on or before given time	
	Business License	

If you have questions concerning the bid submission requirements, please call the Purchasing Department 256-341-4521 or email purchasing@decatur-al.gov.

If you have questions concerning the specifications for this bid contact Jason Lake at 256-341-4912 or by email at jlake@decatur-al.gov.

34”-13.5 Ft² Non-Corrosive Horizontal Fluid Filtration Tank Specification

ENGINEERED SPECIFICATION FOR MATERIALS & DESIGN FOR REPLACEMENT TANKS

Filter System

The filter system specified under this section shall be of a pressurized design and shall consist of “Non-Corrosive” Horizontal Hi-Rate Permanent Media Filter(s) as manufactured by Nemato, LLC..

The filter system shall be of the horizontal type requiring one grade of filter media and shall have a maximum flow of 20 U.S. gallons/minute (13.6 liters/second) per square foot (square meter) of filter area.

The filter tank system shall consist of a 34” (863 mm) horizontal filter tank(s), internal overhead distribution system, internal lower collection system, gauge panel with 2-60 PSIG (400 kPa) gauges, internal automatic air relief, external air relief with a manually adjusted shut off valve, integrally molded 12” x 16” (303 mm x 406 mm) manhole, integrally molded drain/dump port, 2-FRP saddle supports. The filter system shall be fabricated in a fully assembled state by the original equipment manufacturer, then disassembled for shipping to prevent damage to internal parts or face piping.

Filter Tank(s)

The horizontal filter tank(s) shall be 34” (863 mm) in diameter with a total length of 65.75” (1670 mm) without face piping.

Each filter tank(s) shall be manufactured in a two-step process comprised of a patented Closed Cavity Molding (CCBM) of the dished heads and a filament wound body. The heads shall be chemically bonded to the body utilizing a compatible structural adhesive system that creates a lap joint that exceeds the mechanical properties of the FRP laminate. The material used in manufacturing the filters shall be food grade Isophthalic Resin and E Glass that provides a minimum laminate flexural modulus of 1.82E+06 psi and flexural strength of 36.4 ksi.

The filter shall be designed for a maximum working pressure of 100 PSIG (690 kPa) with a Hydrostatic test pressure of 150 PSIG (1035 kPa). The body and dished heads shall vary in thickness to provide durability at the points of maximum stress and the thickness shall be determined through a Finite Element Stress Analysis. A high quality professional finish shall be achieved through the application of a smooth, gelcoated outside surface.

A 12” x 16” (303 mm x 406 mm) integrally molded manhole complete with FRP/ acrylic cover, o-ring, bolt and yoke, shall be located in the front head of the filter tank(s). All o-ring contact points on the manhole port of the head and manhole cover shall have a smooth finish to provide a continuous watertight seal.

An integrally molded 3” (75 mm) combination media dump port and drain complete with an ABS media retainer shall be located in the filter tank(s) front head.

The filter shall have top piped 4” (100 mm) influent and effluent connections that provide a continuous, watertight exterior seal through the use of grooved Sch 120 PVC nipples, clamps and gaskets. The filter tank(s) shall be mounted on two FRP saddle supports, which shall be designed to satisfy Zone 4 earthquake conditions when anchored according to manufacturer’s specifications.

Internal Distribution/Collection System

Internal filter tank equipment shall include an upper distribution system and lower collection system, hydraulically balanced to prevent turbulence and/or displacement of the filter media during service operation or backwash. Standard pipe arrangement or an internal valving system will not be acceptable.

The upper distribution system shall include hydraulic distribution lenses; injection molded ABS plastic, located in multiple sets of two over the filter bed. They shall be joined to the influent nipple connection by means of an o-ring seal to a 4” (100 mm) Sch 80 tee, header, 1¼” (32 mm) PVC nipples and elbows.

The lower collection system shall include 2" (50 mm) laterals; injection molded ABS plastic, designed to retain multiple types of granular filter media or a single grade of #20 silica sand. The laterals shall be strategically placed to produce minimum head loss while providing full filter bed coverage. The laterals shall be self-cleaning through the use of a molded V slot configuration, which promotes thorough filter media cleansing through balanced fluidization during backwash. They shall be joined to the effluent nipple connection by means of an o-ring seal to a 4" (100 mm) Sch 80 tee, header and FRP internal annular duplex fitting.

Filter Area

The filter plant shall consist of 34" (863 mm) Horizontal "Non-Corrosive" Hi-Rate Permanent Media Filter(s) with a total effective filter area of 13.5 sq.ft. (1.25 sq.m) each. When operating at 20 U.S. G.P.M. (13.6 liters/sec) per sq.ft. (sq.m) of filter area, the filter system will have a capacity of filtering 64,800 U.S. gallons (245,295 liters) in 4 hours.

Filter Media

Filter media shall consist of uniformly graded silica with a minimum combined mean percent of silica by weight of 90%, which shall be free of limestone or clay. The media shall be angularly shaped particles of #20 grade silica with an effective size range .45-.55 mm, roundness value between 0.0 and 0.15 and a uniformity coefficient of 1.5 maximum. Round or Sub-rounded particle shapes are not acceptable as suitable media. The specific gravity of the media shall not be less than 2.5 with a minimum hardness of 7 mhos. The filter(s) will require a filter bed depth, which shall extend to an approximate level of 8.7" (219 mm) below the top of the hydraulic distribution lenses.

Pressure Gauge Panel

The pressure gauge panel shall consist of two 2½" (63 mm) diameter gauges scaled from 0-60 PSIG (0 to 400 kPa). The pressure gauges shall be mounted in a machined black HDPE sheet. The pressure gauges shall be connected to influent and effluent pressure points with air relief cocks, compression fittings and semi-rigid PVC tubing.

The filter tanks must be manufactured to exact dimensions as the existing EPD steel filter tanks requiring no modifications of the existing plumbing manifolds during installation.

The filter tanks shall be certified by NSF International to ANSI/ NSF Standard 50 for pool/ spa and salt water applications. The filtration system shall be model # NFS-34-100-135T as manufactured by Nemato Corp or approved equal.

Backwash Valve

One (1) two-way, three port 4-inch backwash valve shall be supplied on each filter tank. The valve body shall be machined from heavy cast bronze. Plastic valve bodies will not be considered for this industrial/commercial use. Victaulic type couplers shall be provided at each port of the valve for connection to the filter tank and manifold piping. Victaulic type couplers shall also be provided for connection to the pool return manifold. Each valve shall be fitted with a nominal 6-inch diameter piston operated hydraulic cylinder to actuate the valve. Electrically or diaphragm actuated valves will not be allowed. External valve linkage will not be allowed for safety and potential maladjustment reasons. The internal piston shaft shall be type 302 stainless steel and shall be supported above and below the piston with Delrin guide bushings. A silicone impregnated felt wiper shall be provided for internal shaft quad ring lubrication. All exterior coating of the valve shall be in accordance with the exterior coating specification of the filter tank. All stainless steel components used in this assembly shall be passivated and rinsed after forming and machining.

The backwash valve shall be designed to allow for continuous circulation pump operation during the cycling between filter and backwash of the filter system. This requirement is for the prevention of potential loss of circulation pump prime and/or damage to boiler, chemical feed systems and piping.

Control System

General

The integrated equipment room control system shall provide continuous monitoring and control of sanitizers (standard ORP probe and Free Cl/Br probe), oxidizers, pH, temperature, filtration system backwash initiation/ cycle functions, system flow rate monitoring, total dissolved solids (TDS), turbidity, chemical inventory levels, surge tank and backwash holding tank water levels, system pressures, and water chemistry balance calculations. Installation of the system shall be per the manufacture's specification and no exceptions shall be allowed. A factory trained/authorized representative shall provide training to the owner. The specified controller is a BECSys7 as manufactured by BECS Technology.

Controller

The controller shall have 120 VAC; <1A fused input and shall come in a NEMA 4X polycarbonate enclosure. The controller shall come with 4 integral 3 A solid-state relay outputs, 5 integral 3A powered mechanical relays outputs for backwash control, and 15 optional 3A solid state and/ or mechanical relays that shall allow assignment of master alarm and equipment room control. The controller shall carry UL 508, (CSA) C22.2 Number 205- M1983, FCC part 15 sub part B product certifications.

Controller Functions

The equipment room control shall perform the following functions:

Main recirculation pump

- Off- surge tank water low level setpoint
- Off- strainer high vacuum setpoint
- Off- backwash duration failsafe (alarm)
- On/off- operation
- On/off- energy saving mode (24 hr, 7 day function)
- On/ off- emergency shut down

Automatic Filter Backwash (must be compatible with existing EPD hydraulic backwash valves)

- Initiation
  - Time (24 hr, 7 day function)
  - Pressure Differential
    - Digital switch or transducer
  - Low System Flow
  - Hi filter effluent turbidity level
  - Manual
- Semi-automatic override & manual advancement
- Fireman cycle heater shutdown
- Backwash frequency lockout (1 backwash per 2 to 24 hours)
- Backwash cycle
  - Off- recirculation pump (optional)

        - Close primary or automatic flow control valves
        - Move filter control valves to backwash position
        - On- recirculation pump
            - Alarm & emergency shutdown of recirculation pump (optional) if valve does not reach backwash position within 45 seconds (programmable)
            - Alarm & emergency shutdown of recirculation pump (optional) if filter stays in backwash beyond programmed time
        - On- operation auxiliary contact during backwash cycle
        - On/off- operation of recirculation pump within hi/lo level setting within backwash holding tank (optional)
        - Off- backwash cycle upon attaining turbidity setpoint in backwash line (optional)
        - Off- recirculation pump (optional)
        - Return filter control valves to filter position
            - Alarm & emergency shutdown of recirculation pump (optional) if valve does not reach filter position within 45 seconds (programmable)
        - Open primary or automatic flow control valves
    - Programmable time delay to sequence backwash cycle of additional filters (0 to 60 minutes)
    - Alternate lead filter in next backwash sequence

Filtration Optimization (sensor optional)

- Monitor filter effluent turbidity, automatically introduce polymer to maintain turbidity setpoint.
    - Overfeed timer- alarm & emergency shutdown of polymer feed system

Water Chemistry Control

- Continuously monitor and control pH, ORP, Cl/Br ppm and Total Dissolved Solids (TDS)
    - Selectable control of sanitizer through ORP and/or amperometric ppm
    - Selectable control of TDS through simultaneous draining of water prior to filtration and addition of fresh make-up water
- Selectable on/off feed or time based proportional feed
    - Time based proportional feed cycle time will vary based upon variance of measurement to setpoint
    - Proportional band of 0 to 2.0 pH units, 0 to 100 mV, 0 to 2 ppm with increased offset from setpoint causing increased feed system operation
    - The controller shall regulate the output of the chemical feed system from 10% to 100% of capacity
    - Sanitizer min/ max residual selectable for non-primary control method (i.e. ORP control can have min/ max amperometric ppm value)
- Feed duration alarm circuit shall disable appropriate feed and activate alarm circuit
    - Sensor failure
    - Chemical feed malfunction
    - Low chemical feed inventory (optional)
    - Overfeed time (programmable from 0 to 18 hrs, 1 minute resolution)
- Visual Hi/ Lo pH, ORP and ppm alarms
    - Hi/ Lo pH alarm shall disable sanitizer chemical feed based on pH feed direction (programmable)

Liquid Level Alarms

- Surge tank low level set point to disable recirculation pump
- Surge tank low level setpoint to initiate auto fill solenoid
- Backwash holding tank high level setpoint to disable recirculation pump
- Backwash holding tank low level setpoint to enable recirculation pump
- pH chemical inventory low level setpoint
- Sanitizer chemical inventory low level setpoint

Flow Monitoring

- Paddlewheel flow sensor
- Flow rate, gpm/ lpm
- Flow volume totalizer

Heater Control

- Temperature control, heater on/ off
- Fireman Cycle, heater off prior to backwash initiation from 0 to 60 minutes
- Energy saving mode, on/ off set time and secondary temperature setpoint

Energy Conservation Mode

- Disable all mechanical and chemical functions during programmed conservation cycle
- Periodically monitor and satisfy all operational requirement based on programmed time
- Interface with Motor Control Center / Variable Frequency Drive for energy conservation.

Control Displays

The display shall be a backlit LCD with 12x40 alpha/ numeric, graphical characters that will continuously display information related to the following:

- pH: 0.0 to 14.0, 0.1 or 0.01 resolution (programmable)
- ORP: -1000 to 1000 mV, 1 mV resolution
- PPM: 0 to 20 ppm 0.1 or 0.01 resolution (programmable)
- Temperature: 32-212°F, 1°F resolution; 0-100°C, 1°C resolution
- Flow rate: 0-8800 gpm, 0.1 gpm resolution; 0-33265 liter/min, 0.1 liter resolution
- Flow volume: 999 trillion gallons, 1 gallon resolution; 999 trillion liters, 1 liter resolution
- Conductivity/ TDS: 0 to 20,000 micromhos/ 0 to 10,000 ppm
- Turbidity: 0 to 20 NTU, 0.01 resolution
- Pressure: programmable range PSI, kPa
- Vacuum: 0 to 31 in./ Hg, 0 to 78 cm/ Hg
- Surge tank and backwash holding tank: programmable range 0.01 ft., 0.01 m
- Chemical Inventory: programmable range 0.1 ft., 0.1 m
- Heater set point & alternate heater set point (4 Event 28 day timer)
- Alternate ORP control set point (4 Event 28 day timer)
- Cl/ Br booster ORP and/or ppm feed points with a separate trigger set points
- Ozone ORP and/or ppm set points
- Dechlorination ORP or ppm set point

- Superchlorination ORP or ppm set point
- Display of Ca hardness & alkalinity
- Langelier & Ryznar index calculated
- Smart menus w/ integrated help

Feed Mode

The controller shall have auto/ manual off/ manual on, which will provide on/off or proportional feed modes. The manual on feed mode must include a programmable time setting.

Data Logging

The controller shall have 512K battery backed-up RAM for input level recording and events.

Thirteen input level recordings for 19 to 56 days depending on sample rate (2 to 6 minutes):

- pH, ORP, ppm, Temperature, & TDS
- Flow Rate, Turbidity, pressure differential & strainer vacuum
- Surge tank level & backwash holding tank level
- Two chemical inventory levels

3800 events over a maximum of 21 days recording all alarms, menu changes and operational cycles related to the following parameters:

- pH, ORP & ppm Hi/ Lo w/ interlocked failsafe
- Temperature & TDS Hi/ Lo w/ heater & TDS failsafe
- System Lo flow & sample stream No Flow
- Turbidity, pressure differential & vacuum Hi
- Surge tank & backwash holding tank Hi/ Lo
- Auto fill & polymer feed failsafe
- Chemical inventory lo
- Backwash initiation, backwash cycle duration, backwash valve time out alarm & failsafe
- Battery Low

Safety Systems

The controller shall have three security password levels with six for operators, two for managers and one for the distributor providing for a history of access identified by the user. The controller shall also have programmable alarms (some disabling chemical feed) for pH, ORP, free chlorine ppm, temperature, low flow & no flow and chemical overfeed, turbidity, pressure & vacuum, surge & holding tank levels, chemical inventory, backwash initiation & cycle duration. All alarm conditions shall activate a master alarm signal provided as a dry contact relay enabling the use of 0-240 VAC alarms.

Alarm Indicators

The controller shall have a flashing LED alarm indicator with an auto polling LCD display of Hi/ Lo out of range, overfeed, low system flow and sample stream no flow.

Remote Operation

The controller shall come with a 33,600 bps data modem for communication via telephone, pager for selectable alarms or fax alarm data conditions via auto dialer. Up to six phone numbers can be selected for paging of specific alarms attached to each phone number. The controller manufacturer shall provide BECSys for Windows™ based remote operation software with graphical display, for interactive

connection and direct connect capability to a PC with the controller. Operational data logs, graphs and event calendars shall be included with the software.

Sensors

The controller shall have four (4) standard sensors and seven (7) optional sensors.

Standard Sensors:

Potentiometric (pH and ORP)

The standard pH and ORP sensors shall have an ABS body with ½" NPT process connection. The standard pH and ORP sensor shall contain 32 milliliters of electrolyte gel. Inorganic electrolyte shall be used to avoid breakdown in the presence of strong oxidants. Each potentiometric sensor shall have a porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction. The pH sensor range shall be 0 - 14. The ORP sensor range shall be 0 - 1000 mV. Each potentiometric sensor shall have a silver/silver chloride (Ag/AgCl) reference element. The pH element shall be a General Purpose Glass Membrane. The ORP element shall be 1 mm diameter platinum wire. The environmental characteristics for the potentiometric sensors shall be: temperature range 0 - 80 degrees C, pressure range 0 - 100 psig.

Temperature

The standard temperature sensor will be a 2 wire, 100 ohm resistive temperature detector (RTD) with a 0.00385 Alpha.

Pressure

Each flowcell shall be equipped with a pressure-sensing device. The pressure sensor shall consist of a compound pressure/vacuum gauge manufactured in stainless steel, 2 ½" diameter, liquid filled with an operating pressure range of 0 to 60 psig and vacuum of 0 to –30 in./ Hg.

Free Chlorine Sensor

The optional Free Chlorine sensor shall be a copper coil probe system with a measuring range of 0.05 to 20 mg/l with a fully selectable scale and a temperature range of 36°-113° Fahrenheit. The amperometric probe shall come with a PVC body, replaceable PTFE membrane and electrolyte, gold cathode and silver/ silver chloride anode.

Flow Sensor

The controller shall provide an optional measurement of pool circulation flow rate utilizing a frequency output paddle wheel flow sensor with a 25 ft. cable and saddle.

Optional Sensors:

Conductivity Sensor

The optional conductivity sensor shall have a measuring range of 0 to 20,000 micromhos and shall come with a 316 SS electrode, PTFE insulator as well as a dual EPR O-ring seal.

Turbidity Sensor

The optional turbidity sensor shall use a nephelometric 90° scattered light method with a measuring frequency in the near-infrared light range of 880 nm with a sapphire measuring window to provide an operating range of 0 to 20 NTU.

Pressure Transducers

The controller shall provide an optional measurement of influent/ effluent filter system pressures utilizing transducers. The transducers may have an operating range from 0 to 20 PSI through 0 to 100 PSI with an output of 4 to 20 mA. The transducers must have a <+/- 2% span max @ 25° C which includes

linearity, hysteresis and repeatability, 0.25% static error band and 1.5% typical thermal error band. The wetted components of the transducer shall be stainless steel with plumbing connections of 1/8”.

Vacuum Transducer

The controller shall provide an optional measurement of recirculation pump vacuum utilizing a transducer. The transducer shall have an operating range of 0 to 30 in./ Hg. with an output of 4 to 20 mA. The transducers must have a <+/- 2% span/ year typical long-term drift, 0.25% static error band and 1.5% typical thermal error band. The wetted components of the transducer shall be stainless steel with plumbing connections of 1/4”.

Liquid Level Sensor

The controller shall provide an optional measurement of three liquid levels for surge tanks, backwash holding tanks and chemical inventory. The level sensor shall be constructed of non-corrosive material and shall be of the type to facilitate capacitance measurement through 2 sensing elements that are contained within a field-adjustable, sealed sensor rod providing a single 4 to 20 mA output. The sensor shall be field-calibratable allowing for site modifications within an operating range from 3 ft to 15 ft.

Flowcell

The flowcell shall have a PVC body, clear acrylic sensor mounting plate and clear acrylic viewing tube. The flowcell design shall provide precise sample flow rate and water velocity regulation past the probes while providing hydro-mechanical cleaning of the free chlorine sensor. The flowcell shall come complete with PVC ½” isolation ball valves, PVC ¼” wet test valve and reed flow switch.

Filter Interface Panel

The filter interface panel shall consist of MRX-24 electronic controller with 2mm orifice solenoids, influent and effluent gauges, and differential pressure switch appropriately sized and compatible with existing filtration system.

The integrated equipment room control system shall be a BECSys7 controller as manufactured by BECS Technology.