



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNRB11077

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF
FRANK WHITTAKER
304-558-2316

VENDOR

RFQ COPY
 TYPE NAME/ADDRESS HERE

SHIP TO

DIVISION OF NATURAL RESOURCES
 PARKS & RECREATION SECTION
 324 4TH AVENUE
 SOUTH CHARLESTON, WV
 25303-1228 304-558-3397

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
01/10/2011				

BID OPENING DATE: 02/08/2011 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
***** ADDENDUM NO. 4 ***** THIS ADDENDUM IS ISSUED TO: EXTEND THE BID OPENING DATE TO: 02/08/2011 AT 1:30 PM. PROVIDE THE DRAWING OMITTED FROM ADDENDUM #3 IN ERROR. PROVIDE THE REVISED SUBSTITUTION REQUEST LANGUAGE AND TO EXTEND THE DEADLINE FOR SUBSTITUTION REQUESTS TO 01/18/2011. NO REQUEST FOR SUBSTITUTIONS WILL BE ACCEPTED AFTER 01/18/2011. PROVIDE THE ATTACHED SPECIFICATION REVISIONS. ***** END ADDENDUM NO. 4 *****						
0001	1	LS		968-42		
GENERAL CONSTRUCTION						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.
2. The State may accept or reject in part, or in whole, any bid.
3. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
4. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods this Purchase Order/Contract becomes void and of no effect after June 30.
5. Payment may only be made after the delivery and acceptance of goods or services.
6. Interest may be paid for late payment in accordance with the *West Virginia Code*.
7. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
8. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
9. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
10. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern the purchasing process.
11. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
12. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.
13. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at www.state.wv.us/admin/purchase/vrc/hipaa.htm and is hereby made part of the agreement. Provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
14. **CONFIDENTIALITY:** The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf>.
15. **LICENSING:** Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, and the West Virginia Insurance Commission. The vendor must provide all necessary releases to obtain information to enable the director or spending unit to verify that the vendor is licensed and in good standing with the above entities.
16. **ANTITRUST:** In submitting a bid to any agency for the State of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the State of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, or person or entity submitting a bid for the same material, supplies, equipment or services and is in all respects fair and without collusion or Fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division. Complete all sections of the quotation form.
2. Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Unit prices shall prevail in case of discrepancy. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
4. All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130
5. Communication during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited (W.Va. C.S.R. §148-1-6.6).

January 3, 2011

TO: ALL BIDDERS

**REF: Greenbrier State Forest
Swimming Pool Filter Replacement
DNRB11077**

SUBJECT: ADDENDUM No. 4

This Addendum Bulletin shall be incorporated in the Construction Contract Documents including the Drawings and Specifications for the Project referenced above. All work amended as listed herein shall be included in your Bid Proposal and the bidder shall acknowledge this addendum on the Bid Form.

The Construction Contract Documents shall be amended as follows:

Corrections to Addendum #3

Subsequent to printing Addendum #3 it was discovered that the drawing referred to in that addendum as "Addendum Drawing #3" was not published. That drawing is attached.

Further, that same drawing is referred to as SD#1 in Addendum #3 at Question 13, 14 and 18 and should be corrected to be referenced as "Addendum Drawing #3".

Substitutions

Due to the changes to the specifications contained in Addenda 1, 2 3 and 4 (this Addendum), any vendor previously submitting a request for product substitution may need to re-submit documentation to address these changes. Revised requests for substitution and additional requests based on these changes will be accepted until 1/18/2011. If no revised request is received from a vendor previously submitting a request, it will be assumed that the previously submitted request is accurate and inclusive of the revised specifications. All product substitutions will be addressed by formal addendum to be issued by the Purchasing Division after the revised deadline has lapsed.

Specifications

The following specification sections shall be added to the project and shall supersede related specifications listed on the project drawings.

**SECTION 22 5100
SWIMMING POOL PLUMBING SYSTEMS (See attached)**

SECTION 26 2923
VARIABLE-FREQUENCY MOTOR CONTROLLERS (See attached)

End of Addendum



FILTER SCHEDULE										
NUMBER	DESIGN GPM	FILTER AREA (SQ.FT.)	FILTER MEDIA QTY. (CU. FT.)	TANK DIMENSION (DIAM x LENGTH)	MAX FLOW (GPM)	GPM/SQFT	MEDIA TYPE	MFR MODEL#	BACKWASH RATE	NOTES
MAIN	388	31.7	BY MFR	40" / 84"	634	12	SAND	NEPTUNE-BENSON 4884SHFFG	475	SINGLE TANK w/ FACTORY FRONT P80 PVC MANIFOLD, FOUR OPERATING VALVES (WBV)

FILTER PUMP SCHEDULE											
POOL	HP	FLOWRATE (GPM)	INLET DISCH. SIZE	SYG. DESIGN PRESS. (FT)	MAX DISCH. PRESS. (FT)	VOLTAGE/PHASE	MFR MODEL#	RPM	TURNOVER RATE	VFD MOTOR STARTER SIZE/ SERVICE MIN. AMPS	NOTES
MAIN	10	388	5" X 4"	70 FT	88 FT	250/3	GRISWOLD R4PH	1760	8.0 HRS	VFD, SINGLE PHASE INLET, 3 PHASE OUT 10 HP - EATON MODEL 5VX0102JBPP1P7 10HP, 50A 3P INPUT/28A 3PH OUTPUT, NEMA3R ENCLOSURE w/ CIRCUIT BREAKER AND POWER SURGE PROTECTOR, P80 w/ 80A 3P BREAKER AND CONDUCTORS, FACTORY START UP IN PROJECT	w/ 8X6 FIBERGLASS STRAINER BY NEPTUNE-BENSON #150NBFG55ER1A88SK09 EP WALKWAY BASKET

HEATER SCHEDULE								
NUMBER	INPUT MAX (MBH)	THERMAL EFFICIENCY	HEATING CAPACITY (MBH)	NET INCH (MBH)	GAS CONNECTION	VENT SIZE	MFR MODEL#	NOTES
HEATER	645	81%	522	454	1-1/4"	8"	LOCHINVAR C8NB845	HIGH AND LOW GAS PRESSURE SWITCH WITH MANUAL RESET



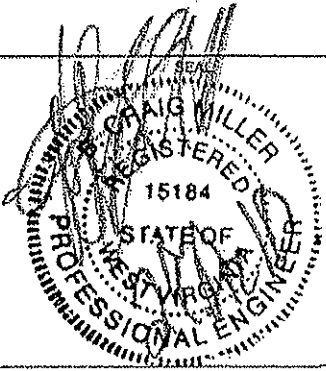
MILLER
ENGINEERING, INC.

PA Office: POB 42, Conradi Fort, PA 15334, 724-896-9615
 WV Office: 260 South Ave Suite 3, Morgantown, WV 26508, 304-281-2214 ph, 304-281-2246 fax, www.millereng.com

ADDENDUM-03 DRAWING

DRWN BY: JMM	DWG DESCRIPTION: REVISIONS TO SCHEDULES	DWG NO: AD#1
REV BY: BCM		SHEET REF: AQ402
DATE: 12/28/2010		REF NO: NA

GREENBRIER STATE PARK POOL



SECTION 22 5100

SWIMMING POOL PLUMBING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and Pipe Fittings, Valves, Strainers.

1.02 REFERENCE STANDARDS

- A. ASME A112.19.8M - Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs; 2007.
- B. ASME A112.19.17 - Manufactured Safety Vacuum Release Systems (SRVS) for Residential and Commercial Swimming Pool, Spa, Hot Tub, and Wading Pool; 2002.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).
- D. ASME (BPV VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2007.
- E. ASTM B 32 - Standard Specification for Solder Metal; 2008.
- F. ASTM B 88 - Standard Specification for Seamless Copper Water Tube; 2009.
- G. ASTM B 88M - Standard Specification for Seamless Copper Water Tube (Metric); 2005.
- H. ASTM D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2006.
- I. ASTM D 2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2006.
- J. ASTM D 2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2002).
- K. NSF 50 - Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs; NSF International; 2009.
- L. UL 1081 - Swimming Pool Pumps, Filters, and Chlorinators; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Include data on pipe materials, pipe fittings, valves and accessories.
 - 2. Include component sizes, rough-in requirements, service sizes, and finishes.
 - 3. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
 - 4. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 5. Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, trappings, and drains.
 - 6. Indicate pump type, capacity, power requirements, and affected adjacent construction. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
 - 7. Provide electrical characteristics and connection requirements.

- C. Shop Drawings: Indicate detailed assembly of components of each system or sub-system.
- D. Manufacturer's Instructions: Indicate installation details, components assembly, and start-up procedures.
- E. Manufacturer's Field Reports: Indicate results of water treatment system set-up and testing.
- F. Project Record Documents: Record actual locations of controlling devices and underfloor piping.
- G. Operation Data: Include installation instructions, lubrication instructions, and assembly views.
- H. Maintenance Data: Include maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in WV Dept. of Natural Resources's name and registered with manufacturer.
- J. Maintenance Materials: Furnish the following for WV Dept. of Natural Resources's use in maintenance of project.
 - 1. Test Kits: One, include supplies and equipment for manual testing of chlorine residual, pH level, and total alkalinity.
 - 2. Test Probes: One.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum ten years of experience.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installation of swimming pool systems.
- B. Perform work in accordance with local health department regulations.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept equipment on site in shipping containers with labelling in place. Inspect for damage.
- B. Protect equipment from damage and elements by maintaining shipping packaging in place until installation. Maintain temporary inlet and outlet caps in place until installation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for water heaters.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Copper Tube: ASTM B 88 (ASTM B 88M), Type L (B), drawn.
 - 1. Fittings: ASME B16.22, wrought copper.
 - 2. Joints: ASTM B 32, solder, Grade Sn95.

- B. PVC Pipe: ASTM D 1785, Schedule 80.
 - 1. Fittings: ASTM D 2467, PVC.
 - 2. Joints: ASTM D 2855, solvent weld.
- C. Unions for Pipe Sizes 2-1/2 Inches and Under: PVC for plastic piping; bronze unions for copper pipe, soldered joints.
- D. Flanges for Pipe Sizes over 2-1/2 inches: P80 PVC for plastic piping; bronze for copper piping. Stainless steel hardware.
- E. Valves- PVC piping: 2-1/2" and below: P80 PVC plastic body and ball, double lever handle, double union with socket ends, EPDM seals, teflon seats.
- F. Butterfly Valves- PVC piping: above 2-1/2": PVC body, PVC disc, resilient replaceable seat for service to 180 degrees F (82 degrees C) wafer style, 10 position lever handle.
- G. Piping Glue: All PVC pipe glue will be Elson Heavy bodied PVC glue with purple primer, or approved equal.

2.02 CLOSE COUPLED PUMPS

- A. Manufacturers:
 - 1. Griswold.
 - 2. Substitutions: See project bidding front end documents. Must be approved prior to bidding. Bidder must submit sufficient information to prove substitution is a technical and performance equal.
- B. NSF Listing: Provide products that are NSF listed under NSF 50.
- C. Type: Horizontal shaft, single stage, single or double suction, direct connected, radially or horizontally split casing, for 125 psi maximum working pressure.
- D. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connections, drain plug, flanged suction and discharge.
- E. Impellers: Bronze, fully enclosed, keyed to motor shaft extension.
- F. Shaft: Stainless steel.
- G. Seals: Carbon rotating against a stationary ceramic seat, maximum continuous operating temperature of 225 F.

2.03 POOL FITTINGS AND EQUIPMENT

- A. Manufacturers:
 - 1. Neptune Benson
 - 2. Paddock.
 - 3. Substitutions: See project bidding front end documents. Must be approved prior to bidding. Bidder must submit sufficient information to prove substitution is a technical and performance equal.
- B. NSF Listing: Provide products that are NSF listed under NSF 50.
- C. Hair and Lint Strainer:
 - 1. Reinforced fiberglass molded body with basket with minimum 12:1 ratio of free area to pipe inlet area, removable lexan cover.

2.04 COMMERCIAL FILTERS

- A. Manufacturers:
 - 1. Neptune Benson.
 - 2. Substitutions: See project bidding front end documents. Must be approved prior to bidding.

Bidder must submit sufficient information to prove substitution is a technical and performance equal.

- B. NSF Listing: Provide products that are NSF listed under NSF 50.
- C. Filter Media: Sand.
 - 1. Sand Medium: Hard, durable grains of rounded or sub-angular silica sand, maximum 1 percent flat or micaceous particles, effective size of 0.17 inch and uniformity coefficient of 1.35.
- D. Tank: Fiberglass reinforced tank with mounting base.
- E. Internal Inlet System: Schedule 80 PVC pipe, consisting of header and laterals with orifices pointed downwards, designed for maximum 8 fps velocity of water in laterals at rated filter capacity. Space laterals and orifices to ensure uniform water flow through filter bed during filter and backwash operations.
- F. Underdrain System: Schedule 80 PVC pipe, consisting of header and laterals with orifices pointed downwards, designed for maximum 10 fps velocity of water in laterals at rated filter capacity. Space laterals and orifices to ensure uniform water flow through filter bed during filter and backwash operations.
- G. Gage Panel: Mount on tank and provide with 4 inch diameter influent and effluent pressure gages connected by tubing to nipples on tank nozzles; with NSF stainless steel name plate.
- H. Factory piping manifold: factory assembled and glued P80 PVC pipe and fitting manifold with four (4) P80 PVC wafer butterfly (WBV) valves, all flanges to be vanstone free-ring type. all hardware to be stainless steel. All manifold piping glue will be Elson Heavy bodied PVC glue with purple primer, or approved equal.
- I. Piping Glue: All PVC pipe glue will be Elson Heavy bodied PVC glue with purple primer, or approved equal.

2.05 SURGE TANKS

- A. Tank:
 - 1. Pre-cast concrete, 4: wall thickness, with lide, extenstion ring, to flush pool deck lid
- B. Float Valve:
 - 1. PVC flange body with wafer type disc on stainless steel shaft and two stainless steel float rods and polyethylene floats. Disc shall be 20 percent open with float up and full open with float down.

2.06 POOL WATER TREATMENT (CHLORINE INJECTION)

- A. Manufacturers:
 - 1. Strantrol/ Siemens; Model System 3i.
- B. Regulator: Continuously monitor pH and chlorine levels and control chemical feed pumps. Maintain PH of 7.5 and free chlorine residual of 0.9 ppm. Mount regulator in surface mounted general purpose enclosure of fiberglass or molded plastic construction and incorporate:
 - 1. On/off switch.
 - 2. Green light to indicate regulator is energized.
 - 3. Relays for direct switching of pump motors.
 - 4. Red lights for abnormal conditions.
 - 5. Interlock to prevent chlorine feed when pH is abnormal.
- C. Sensors: PH, HRR, FLOW only. Electrode with coaxial cable for attachment to controller. Sensor fill - ploysulfone 28mL inorganic electrolyte.
- D. pH: range 2-12, 0.1 resolution

- E. HRR: 0-1000mV, 1mV; derived ppm cl₂, 0.2 - 3, 0.6 - 6, or no ppm
- F. Outputs: 5amps @ 115VAC - 3 solid state relays for sinlge pool control
- G. pH control for flow restored delay
- H. HRR control for flow restorewd delay
- I. NO data logging
- J. Communications: direct, modem, TCP
- K. With rotoary flow cell/ sensor housing.
- L. Flow Cell: Shuts down controller on no flow through sampling line.
- M. Systems with capabilities in excess of those set forth above will not be considered: Capabilities which are NOT acceptable include items such as: pager callout, fax callout, phone callout, programmable alarms, graphical user interface. Control parameters which are not acceptable include items such as: Alternate HRR, Dechlorination Setpoint, Superchlorination. Such capabilities represent a system/ control complexity not required by or acceptable to the Owner.
- N. Liquid Chlorinator: System consisting of two tanks with injector pumps to feed liquid chlorine (bleach) and muriatic acid.
 1. Solution Tanks: 2-200 gallon (chlorine) and 30 gallon capacity, polyethylene, self-supporting, one gallon graduated markings; molded fiberglass cover, and direct reading scale.
 2. Metering Pumps: Stenner Peristoltic pumps - as scheduled

2.07 GAS FIRED POOL HEATER

- A. Manufacturers:
 1. Lochinvar; Model as scheduled.
- B. Type: Automatic, gas-fired, copper fin tube.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install Work in accordance with State of WV, standards.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Install piping to conserve building space, not interfere with use of space and other work. Route piping in orderly manner, and maintain gradient. Group whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Provide access to valves and fittings.
- E. Pipe relief valve outlet and backwash to nearest floor drain.
- F. Install unions downstream of valves and at equipment or apparatus connections.
- G. Pumps:
 1. Provide air cock and drain connection on horizontal pump casings.
 2. Provide line sized valve and strainer on suction and line sized soft seated check valve and valve on discharge.
 3. Decrease from line size, with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and over.

H. Filter Tanks:

1. Provide support for tanks independent of building structural framing members.
2. Clean and flush tank prior to delivery to site. Seal until pipe connections are made.
3. Provide two day's training on pool operation, one prior to substantial completion, and one 30 days after closeout as requested by the Owner.

END OF SECTION

SECTION 26 2923

VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Variable frequency controllers.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; National Electrical Manufacturers Association; 2006.
- B. NEMA ICS 7 - Industrial Control and Systems: Adjustable-Speed Drives; National Electrical Manufacturers Association; 2006.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.
- D. Test Reports: Indicate field test and inspection procedures and test results.
- E. Manufacturer's Field Reports: Indicate start-up inspection findings.
- F. Operation Data: NEMA ICS 7.1. Include instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions.
- G. Maintenance Data: NEMA ICS 7.1. Include routine preventive maintenance schedule.
- H. Maintenance Materials: Furnish the following for WV Dept. of Natural Resources's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Air Filters: Two of each type.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 continuous years documented experience manufacturing the product under the product name submitted; and with service facilities employing factory trained service Engineer(s) within 200 miles of Project.
- C. The supplier of the assembly shall be the manufacturer of the electromechanical power

components used within the assembly, such as bypass contactors when specified.

- D. For the equipment specified herein, the manufacturer shall be ISO 9001 certified.
- E. The supplier of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with these requirements.
- F. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. EATON
- B. Substitutions: See project bidding front end documents. Must be approved prior to bidding. Bidder must submit sufficient information to prove substitution is a technical and performance equal.

2.02 DESCRIPTION

- A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
 - 1. Employ microprocessor-based inverter logic isolated from power circuits.
 - 2. Employ pulse-width-modulated inverter system.
 - 3. Design for ability to operate controller with motor disconnected from output.
 - 4. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.
- B. Enclosures: NEMA 250, Type 3R, suitable for equipment application in places accessible only to qualified personnel.
- C. Finish: Manufacturer's standard enamel.

2.03 OPERATING REQUIREMENTS

- A. Rated Input Voltage: 240 volts, single phase, 60 Hertz.
- B. Motor Nameplate Voltage: 208 volts, three phase, 60 Hertz.
- C. Displacement Power Factor: Between 1.0 and 0.95, lagging, over entire range of operating speed and load.
- D. Operating Ambient: 0 degrees C to 40 degrees C.
- E. Volts Per Hertz Adjustment: Plus or minus 10 percent.
- F. Current Limit Adjustment: 60 to 110 percent of rated.
- G. Acceleration Rate Adjustment: 0.5 to 30 seconds.
- H. Deceleration Rate Adjustment: 1 to 30 seconds.

- I. Input Signal: 4 to 20 mA DC., 0 - 10 VDC

2.04 COMPONENTS

- A. Display: Provide integral digital display to indicate output voltage, output frequency, and output current.
- B. Status Indicators: Separate indicators for overcurrent, overvoltage, ground fault, overtemperature, and input power ON.
- C. Furnish HAND-OFF-AUTOMATIC selector switch and manual speed control.
- D. Include undervoltage release.
- E. Control Power Source: Integral control transformer.
- F. Door Interlocks: Furnish mechanical means to prevent opening of equipment with power connected, or to disconnect power if door is opened; include means for defeating interlock by qualified persons.
- G. Safety Interlocks: Furnish terminals for remote contact to inhibit starting under both manual and automatic mode.
- H. Control Interlocks: Furnish terminals for remote contact to allow starting in automatic mode.
- I. Disconnecting Means: Include integral circuit breaker on the line side of each controller.
- J. Wiring Terminations: Match conductor materials and sizes indicated.

2.05 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.
 - 1. All printed circuit boards shall be functionally tested via automatic test equipment prior to unit installation.
 - 2. After all tests have been performed, each AFD shall undergo a burn-in test. The drive shall be burned in at 100% inductive or motor load without an unscheduled shutdown.
 - 3. After the burn-in cycle is complete, each AFD shall be put through a motor load test before inspection and shipping.
- B. The manufacturer shall provide three (3) certified copies of factory test reports.
- C.

2.06 SOURCE QUALITY CONTROL

- A. Shop inspect and perform standard production tests for each controller.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface is suitable for controller installation.
- B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.
- C. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- B. Tighten accessible connections and mechanical fasteners after placing controller.

- C. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- D. Neatly type label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place in clear plastic holder.

3.03 FIELD QUALITY CONTROL

- A. A. Provide the services of a qualified manufacturer's employed Field Service Engineer to assist the Contractor in installation and start-up of the equipment specified under this section. Field Service personnel shall be factory trained with periodic updates and have experience with the same model of AFD on the job site. Sales representatives will not be acceptable to perform this work. The manufacturer's service representative shall provide technical direction and assistance to the Contractor in general assembly of the equipment, installation as specified in manufacturer's installation instructions, wiring, application dependant adjustments, and verification of proper AFD operation.
- B. Inspect and test in accordance with NETA STD ATS, except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.17.
- D. The AFD manufacturer shall perform harmonic measurements at the point where the utility feeds multiple customers (PCC) to verify compliance with IEEE519-1992. A report of the voltage THD and current TDD shall be sent to the engineer. The contractor shall provide labor, material, and protection as needed to access the test points. The readings shall be taken with all drives and all other loads at full load, or as close as field conditions allow.

3.04 ADJUSTING

- A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of controllers in automatic and manual modes.

END OF SECTION