

Q4. Will Gwinnett County accept Hurst Series 250 2-pass semi-wet back? The S250 has the serviceability of a dry back boiler, but with less maintenance as compared to a multipass dry back.

A4. Requests for approval of an "approved equal" product will only be evaluated following the Bid opening. Approval of any "or equal" products submitted for consideration will be at the Owner and Engineer's sole discretion.

III. Attachments

- Revised Section 01 1000 Summary
- Revised Section 01 7300 Execution
- Revised Section 23 5239 Fire Tube Boilers

Acknowledge receipt of this addendum on the firm information page of the request for proposal.

Sincerely,

Brittany Bryant, CPPB

Purchasing Associate III

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Contract description.
 - 2. Work by Owner or other Work at the Site.
 - 3. Owner-supplied products.
 - 4. Contractor's use of Site and premises.
 - 5. Work sequence.
 - 6. Owner occupancy.
 - 7. Permits.
 - 8. Specification conventions.

1.2 CONTRACT DESCRIPTION

- A. Projection Location: F. Wayne Hill Water Reclamation Center, 1500 One Water Way, Buford, Georgia 30518
- B. Owner: Gwinnett County Department of Water Resources, 684 Winder Highway, Lawrenceville, Georgia 30045
- C. Project Description:
 - 1. Architectural
 - a. Demolition of roll-up door and double doors.
 - b. Patching and repair of walls. Installation of new roll-up door, double door, and personnel door. Painting of interior walls in Boiler Room. Floor coating system in the Boiler Room.
 - 2. Structural
 - a. Demolition of CMU partition wall in Boiler Room, removal of concrete equipment pads where equipment is being replaced. Removal to include both equipment pad types, isolated pads on grade and pads on slab (housekeeping pads). Removal of concrete wall section above existing roll-up door, removal of concrete wall section to create new opening for new personnel door.
 - b. Infill openings left in slab, new concrete equipment pads on top of existing slab, structural support of existing CMU partition wall.
 - 3. Mechanical
 - a. Phased demolition of 4 existing heating water boilers, pumps and primary pumping.
 - b. Remove and Store existing Boilers 1 and 2, on-site at designated storage area. Refer to Part 1.5.A.1 for further details.
 - c. Temporary piping and pumping installation utilizing 2 existing boilers coupled with 2 new pumps to allow continued heating water system operation.
 - d. Phased installation of 3 new boilers to provide N+1 functional capacity with future expansion for 4th boiler.
 - e. Phased replacement of existing carbon steel bio-gas piping with stainless-steel piping sized for new and future boilers.
 - f. Phased piping of natural gas to new boilers.
 - g. Installation of new primary heating water piping loop with dedicated primary pumps for each boiler.
 - h. Installation of new secondary hot water piping loop to connect to existing secondary distribution headers.

**F. Wayne Hill Water Resources Center
Boilers and Hot Water Supply Pumps Replacement
DWR Project # M1190-49
Gwinnett County, Georgia
Gresham Smith Project No.: 45483.15**

- i. Installation of 4 new secondary pumps including repurposing of temporary pumps for permanent use.
 - j. Replacement and re-piping of 7 existing tertiary heating hot water pumps.
 - k. Re-pipe existing digester tertiary heating water loops to install new temperature control valves and improve flexibility of pump operation.
 - l. Re-pipe 2 existing FOG tertiary heating water loops to install new temperature control valves.
 - m. Re-pipe 1 existing utility hot water loop and heating water loop modifications to install new system storage tank, temperature control valve and storage tank circulation pump to provide controlled temperature utility hot water using existing utility hot water distribution system.
 - n. Re-pipe existing Jenbacher cogeneration hot water heat recovery system on heating water side of existing plate and frame heat exchanger including addition of new heat recovery hot water circulation pump.
 - o. Connection to existing W-1 water supply with cross connection protection to provide back-up water supply for heating water system make-up.
 - p. Demolition of boiler room ventilation fans and louvers.
 - q. New boiler room combustion air intake, ventilation supply fan and controls.
 - r. New boiler room intake and fan for cooling season ventilation and controls.
4. Electrical
- a. Remove the existing Boiler 1 and 2, power feeds. The Control conductors to the Boiler Master Control Panel shall be removed. Remove Instrument conductors to the Master Boiler Control panels. Demolish the Boiler end conduit to a point where it can be repurposed for the new Boiler 1R and 2R units.
 - b. Demo the existing Primary Loop Pumps power, instruments and controls in stages. (3 pumps need to stay operational for each step). Some of the conduit may be re-used.
 - c. Demo the existing Secondary Loop Pumps, instruments and control one pump at a time. (Only one DSL and one FOG system can be taken out of service at a time). Some of the conduits may be re-used. The Existing Electrically Actuated valves in the project are on a PAKSCAN (RS485 based) communication network in a loop configuration. When one of these is to Demolish. A NEMA 4X junction box has to be set with a six terminal - terminal strip and connected to restore the loop communication bi-directional redundancy.
 - d. Furnish new MCC units (breakers) in MCC-40A, 40B, 40C, 40D, 31, 32, 33 to supply the new / replaced loads. A few Power Panel Circuit breakers will also be needed.
 - e. Install the 13 new VFD's for the new pumps on the building walls in the Area 40 building. Rework the power feed to them as noted in the demolition above. Install new VFD cable power and control feeds from the VFD's to the new pump locations.
 - f. A new Go-No-Go control station needs to be added near the new Man Door to the boiler room on the building exterior. A new Emergency Exit Light needs to be added above the door on the inside. The double doors to the boiler room will be replaced by a motorized roll up door. Power and local controls will have to be installed for this.
 - g. Install power feeds for the new Boiler 1R and 2R, power feeds. Install the power and controls from each Boiler Control Panel to its Blend Pump. A communication Cat 6 cable is to be installed to the Boiler Master Control Panel for each Boiler system. Install the new Boiler Instruments not included prewired in the Boiler package and wire to the Master Boiler Control panels. The new motorized valves will be hardwired to the Boiler Master Control Panel.
 - h. Each Boiler has a New Primary Loop pump. Each pump has a new power feed from the Electrical Room. Each Pump has its controls and instrumentation wired to the Boiler Master Control Panel.
 - i. NOTE: The Primary and Secondary Pumps Demolished in the above paragraphs are renamed Secondary and Tertiary for their replacements below.
 - j. Install the new Secondary Loop Pumps power, instruments, and controls in stages. (3 pumps need to stay operational for each step). Some of the conduit near the electrical room may be re-used. The controls and instrumentation wires to the Boiler Master Control Panel.

- k. Install the new Tertiary Loop Pumps, instruments, and controls one pump at a time. (Only one DSL or FOG system can be taken out of service at a time). Some of the conduit near the electrical room may be re-used. The New Motorized Control valves in this area will be hardwired to the Plant SCADA system.
 - l. The Boiler Master Control Panel needs to be modified to control the operation of the new Boilers, New Primary Loop Pumps, and New Secondary Loop Pumps and their associated controls and instrumentation through each step.
 - m. The Plant SCADA system needs to be modified by MR Systems to accommodate the Boiler master Control Panels and the for the changes to the New Tertiary CHP and Utility Pumps and their controls and instrumentation.
 - n. Remove the existing Boiler 3 and 4, power feeds. The Control Wiring to the Boiler Master Control Panel shall be removed. Remove Instrument wiring to the Master Boiler Control panels. Demolish the Boiler end conduit to a point where it can be repurposed for the new Boiler 3R unit.
 - o. Install power feeds for the new Boiler 3R, power feeds. Install the power and controls from each Boiler Control Panel to its Blend Pump. A communication Cat 6 cable is to be installed to the Boiler Master Control Panel for each Boiler system. Install the new Boiler Instruments not included prewired in the Boiler package and wire to the Master Boiler Control panels. The new motorized valves will be hardwired to the Boiler Master Control Panel.
 - p. Provide all power wiring, and connections as indicated on the drawings or as required for the proper operation of all electrically operated equipment. Power wiring designated for reuse are to undergo visual inspection, continuity, and megger testing.
 - q. Provide Electrical Arc Flash Analysis, Short-Circuit and Coordination Study. Apply New Arc Flash labels to the Area 40 switchgear.
5. Instrumentation
- a. Coordinate, integrate, furnish, install, test and commission all instrumentation, control and monitoring software, hardware, incidentals and PLC logic as needed to implement the systems as indicated on the drawings and in the specifications.
 - b. Modify the existing Boiler Master Control Panel as needed to monitor and control new hot water systems.
 - c. Heal the Pakscan network where valves are removed or replaced and utilize the distributed control system to control and monitor all new or replacement valves.

1.3 WORK BY OWNER OR OTHERS

- A. If Owner-awarded contracts interfere with each other due to work being performed at the same time or at the same Site, Owner will determine the sequence of work under all contracts according to "Work Sequence" and "Contractor's Use of Site and Premises" Articles in this Section.

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Limit use of Site and premises to allow:
 - 1. Owner occupancy: Full time, continuous
 - 2. Owner staff: Uninterrupted operation of wastewater treatment facility.
- B. Access to Site: Limited to Boiler Room, Residuals Gallery, Dewatering Building, FOG System Area, and Contractor staging and laydown areas.
- C. Emergency Building Exits during Construction: Limited to Boiler Room and Residuals Gallery.
- D. Construction Operations: Limited to areas indicated on Drawings.

- E. Noisy and Disruptive Operations (Use of Jack Hammers and Other Noisy Equipment): Coordinate and schedule such operations with Owner to minimize disruptions.
- F. General: Contractor shall have limited use of premises for the proposed construction operations during the construction period. All use of the Project site shall be coordinated with Owner's Operations Staff, and is limited by Owner's right to perform work or to retain other contractors on portions of the Project.
- G. Regular working hours may be Monday through Friday, excluding holidays, occurring between the hours of 7:00 AM and 4:00 PM, unless restricted otherwise. Contractor shall establish regular scheduled work times, e.g., five 8-hour days, within the hours and days allowed above. Approval for specific work outside regular scheduled work times shall be requested no less than 5 business days prior to the requested work period. Contractor shall request approval of changes in regular scheduled work times no less than one week prior to the desired change. Occasional unscheduled overtime on weekdays may be permitted provided reasonable notice is given to Owner and no inspections are required.
- H. Utility Outages and Shutdown:
 - 1. Coordinate and schedule electrical and other utility outages with Owner.
- I. Outages: Allowed only at previously agreed upon times.
 - 1. At least five workdays before scheduled outage, submit Outage Request Plan to Owner itemizing the dates, times, and duration of each requested outage.
 - 2. Limit the shutdown of any portion of the Hot Water Recirculation System to no more than 12 hours.
- J. Sound Level Restrictions: Sound pressure level measured at boundary of Site shall not exceed 80 dBA.
- K. Construction Plan: Before start of construction, submit three copies of construction plan regarding access to Work, use of Site, and utility outages for acceptance by Owner. After acceptance of plan, construction operations shall comply with accepted plan unless deviations are accepted by Owner in writing.

1.5 WORK SEQUENCE

- A. Construct Work in phases in order to accommodate Owner's requirements for continuous use of the existing Hot Water Supply System during construction period. Coordinate construction schedule and operations with Owner and Engineer:
 - 1. Phase 1 Demolition: Structural work includes demolition of CMU partition wall in Boiler Room, removal of concrete equipment pads and portions of existing slab on grade, and removal of concrete wall section above existing roll-up door. Architectural work includes removal of existing Roll-up doors. Mechanical work involves removal of Boilers, pumps, piping and other devices as indicated on the Phase 1 Demolition Drawings. Contractor will Remove and Store the existing Boilers 1 and 2 until the Phase 1 new boiler work has been completed and accepted by the Owner. This includes all gas train components and associated valves, controls, as well as the adjacent hot water piping isolation valves for each boiler. Store the Boilers and accessories on-site, protected from the elements. Storage of the existing boilers and accessories shall conform to the provisions of Section 01 60 00 Product Requirements, Part 1.5. Following the acceptance of the Phase 1 new work and approval by Owner, Contractor will Remove the old Boilers 1 and 2 and dispose of them off-site in accordance with the Specifications. Electrical work includes demolition of electrical devices, conductors, and associated MCC components in coordination with the Phase 1 Mechanical demolition.
 - 2. Phase 1 New Work: Structural work includes pouring new concrete slabs on grade and new equipment pads, as well as miscellaneous structural improvements. Architectural work includes installation of new doors as indicated on the Drawings. Mechanical work involves installation of two new Boilers, pumps, piping, expansion tanks, ventilation equipment and other miscellaneous devices as indicated on the Phase 1 New Construction Drawings. Electrical work includes installation of new electrical devices, instruments, conductors, conduits, VFDs, and associated MCC components in coordination with the Phase 1 New Mechanical Work. Startup and testing of new equipment installed in this phase will be included.

3. Phase 2 Demolition: Structural work includes removal of concrete equipment pads. Mechanical work involves removal of Boilers, pumps, piping and other devices as indicated on the Phase 2 Demolition Drawings. Electrical work includes demolition of electrical devices, conductors, and associated MCC components in coordination with the Phase 2 Mechanical demolition.
4. Phase 2 New Work: Structural work includes pouring new concrete equipment pads. Architectural work includes painting and floor coatings. Mechanical work involves installation of one new Boiler and associated pumps, piping, and other miscellaneous devices as indicated on the Phase 2 New Construction Drawings. Electrical work includes installation of new electrical devices, instruments, conductors, conduits, VFDs, and associated MCC components in coordination with the Phase 2 New Mechanical Work. Startup and testing of new equipment installed in this phase will be included.

- B. Sequencing of Construction Plan: Before start of construction, submit electronic file, via Newforma, of construction plan detailing the phasing of demolition, renovation, and new Work for acceptance by Owner and Engineer. After acceptance of plan, construction sequencing shall comply with accepted plan unless deviations are accepted by Owner in writing.

1.6 OWNER OCCUPANCY

- A. Schedule and substantially complete designated portions of the Work for occupancy before Substantial Completion of the entire Work.
- B. Owner's use and occupancy of designated areas before Substantial Completion of the entire Project do not relieve Contractor of responsibility to maintain specified insurance coverages on a 100 percent basis until date of final payment.
- C. Owner will occupy Site and premises during entire period of construction for conduct of normal operations.
- D. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- E. Schedule the Work to accommodate Owner occupancy and use.

1.7 PERMITS

- A. Owner provided permits for construction of Work include the following:
 1. Hot Work.
- B. Supply all necessary permits for construction of Work including the following:
 1. Building permit.



Submit for an installation permit with the State of Georgia:

1. Permit application to be submitted through the following Citizenseve link: https://www4.citizenseve.com/Portal/PortalController?Action=showHomePage&ctzPagePrefix=Portal_&installationID=360
2. Contractor to ensure that installation is completed by Class 1 licensed contractor for HP boilers.
3. Contractor to ensure that installation is done in accordance with NBIC Part 1.

1.8 SPECIFICATION CONVENTIONS

- A. Specifications are written in imperative mood and streamlined form. This imperative language is directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (;) is used within sentences or phrases.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

- C. Owner Documents: Certain bidding and contracting documents included in the Project Manual documents were prepared by the Owner. These documents were included in the Project Manual without modification by Gresham Smith and are not issued under the seals of the Engineer or its consultants.
- D. Send requests for Information relating to Owner documents directly to the Owner's designated Project representative with a copy to the Engineer. The Owner will respond to such RFIs.
- E. No provision in the Owner's documents shall be effective to change the duties and responsibilities of Gresham Smith from those stated in its Agreement with the Owner.

1.9 Gresham Smith is not responsible for enforcing provisions of Owner documents relating to construction safety.

1.10 PROJECT INFORMATION EXCHANGE

- A. Project Information Exchange: The Engineer will provide access to relevant Project files through its project information management software Newforma without charge to Contractor and provide instruction on its use. This software includes the ability to exchange large files and large numbers of files.
- B. Contract Documents will be issued using this software.
- C. Contractor shall use this software for transmitting all files for contract administration documents; no other method is acceptable. The Engineer will not download documents from Contractor's FTP site.
- D. Additional requirements for specific types of contract administration documents are specified in other Division-01 Specifications sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

ISSUE	DATE
ISSUED FOR BID	August 31, 2023
REVISION 1	October 30, 2023

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END OF SECTION

SECTION 01 7300 – EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements governing execution of the Work including but not limited to the following:
 - 1. Construction layout.
 - 2. Installation of the Work.
 - 3. Cutting and patching.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Sections include the following:
 - 1. Section 01 3100 "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Section 01 3300 "Submittal Procedures" for submitting surveys.
 - 3. Section 01 7700 "Closeout Requirements" for submitting a final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
- B. Manufacturer's Installation Instructions: Obtain and maintain on site the manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of utilities and construction indicated as existing are not guaranteed.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION


- A. Field Measurements: Take field measurements as required to properly fit the Work. Recheck measurements before installing each product. Where portions of Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Notify Engineer immediately on discovering the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Engineer promptly.

3.4 INSTALLATION

- A. General: Accurately locate the Work and components of the Work in correct alignment and elevation as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so that no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachments: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 - 2. Allow for thermal expansion and contraction, deflection, and normal building movements.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Isolate products from incompatible materials as needed to prevent deterioration.
-  J. The FM Global Red Tag Permit System should be used to monitor all valve operations. All valve closures, which impair existing fire protection, should be closely coordinated with plant fire protection personnel and the FM Global Atlanta Operations office. Notification should be made to the customer service desk of FM Global at:
 - 1. Phone: (1) 888-216-9323
 - 2. Fax: (1) 888-216-9327
 - 3. Email: atlacustomersservicedesk@fmglobal.com
- K. Hot work of any kind should be avoided. If there is a practical and safer way to do the job without hot work, the alternative method should be used. If hot work is unavoidable, precautions such as those outlined on the FM Global Hot Work Permit System should be taken during any such work.

3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- C. Temporary Support: Provide temporary support of work to be cut.
- D. Existing Utility Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to prevent interruption to occupied areas.
- E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations including excavation, using methods least likely to damage elements retained or adjoining construction.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Concrete and Masonry: Cut using a cutting machine such as an abrasive saw or a diamond-core drill.
 - 3. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 4. Mechanical and Electrical: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 5. Excavating and Backfilling: Not anticipated in this project.
 - 6. Proceed with patching after completion of construction operations requiring cutting.
- F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Provide materials and comply with installation requirements specified in other Sections where applicable.
 - 1. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 2. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
 - 3. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- B. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- C. Site: Maintain Project site free of waste materials and debris.
- D. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Waste Disposal: Do not bury or burn waste materials on site. Do not wash waste materials down sewers or into waterways.

- G. Sweep indoor concrete and paved areas broom clean daily.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 4000 "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in the condition that existed at commencement of the Work.

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction.
- B. Restore permanent facilities used during construction to their specified condition.

ISSUED	DATE
ISSUED FOR BID	August 31, 2023
REVISION 1	October 31, 2023

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SECTION 23 5239 - FIRE TUBE BOILERS


PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes equipment procurement, delivery, installation verification, and operational verification for packaged, factory-fabricated and -assembled boilers, trim, and accessories.
 - 1. Generating
 - a. Hot water with the following configurations and burners:
 - 1) Boiler
 - (a) Horizontal, fire-tube
 - 2) Burner
 - (a) Fuel
 - (1) Utility distributed Natural Gas
 - (2) Site generated Digester Gas
- B. Related Requirements:
 - 1. Section 01 3300 Submittal Procedures
 - 2. Section 01 7823 Operation and Maintenance Data

1.2 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
-  B. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Process and Instrumentation Diagrams
 - 2. Wiring Diagrams: Power, signal, and control wiring.
 - 3. Control panel drawings including layouts and schematics.
 - 4. Manufacturer's installation instructions
 - 5. Digester Fuel Flame Arrestor
 - 6. Safety Shut Off Valves
 - 7. Ignitor Details
 - 8. Flame Detectors
- C. Manufacturer Seismic Qualification Certification: Submit certification that boiler, accessories, and components will withstand seismic forces defined below. Include the following:
 - 1. Seismic Criteria:
 - a. Seismic Importance Factor, $I_e = 1.00$
 - b. Risk Category = II
 - c. Mapped 0.2 Second Spectral Response Acceleration, $S_s = 0.199$
 - d. Mapped 1.0 Second Spectral Response Acceleration, $S_1 = 0.087$
 - e. Site Class = D
 - f. 0.2 Second Spectral Response Coefficient, $S_{DS} = 0.212$
 - g. 1.0 Second Spectral Response Coefficient, $S_{D1} = 0.140$
 - h. Seismic Design Category = C
 - 2. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event.:"
 - 3. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 4. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

- D. Source quality-control test reports.
- E. Detailed installation instructions including anchoring requirements.
-  F. Fill out form X82, Part A, for each boiler, and include in the shop drawing submittal.
- G. At the time of commissioning, fill out form X82, Part B, and leave it with the owner. A copy must be submitted to FM Global for their records.
- H. Field quality-control test reports.
- I. Operation and Maintenance Data: For boilers, components, and accessories to include in emergency, operation, and maintenance manuals.
 - 1. Documents shall be provided in a searchable PDF format, reviewed and approved by Owner.
- J. Warranty: Special warranty specified in this Section.
- K. Other Informational Submittals:
 - 1. Startup service reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
- C. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
- D. UL Compliance:
 - 1. Test Boilers for compliance with
 - a. UL 795, "Commercial-Industrial Gas Heating Equipment."
 - 2. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

1.4 DELIVERY

- A. Deliver boilers to the project site. Coordinate delivery dates for each boiler with the Contractor, Owner and/or Owner's authorized agent. Provide instructions for off-loading. Contractor shall be responsible for off-loading of each boiler from the delivery vehicle. Provide authorized representative to witness and certify no damage occurs during offloading.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Provide dimensional layout of anchors and base capacity requirements for installation contractor. Verify prior to setting of boilers.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace front- and rear-door refractories and heat exchangers of boilers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Additional information:
 - a. One year from successful completion of commissioning on any fuel OR eighteen months from delivery whichever occurs first.
 - b. Warranty shall include a periodic preventative maintenance (PM) inspection, the PM inspections shall be provided as follows:

**F. Wayne Hill Water Resources Center
Boilers and Hot Water Supply Pumps Replacement
DWR Project # M1190-49
Gwinnett County, Georgia
Gresham Smith Project No.: 45483.15**

- 1) Once per month for first 3 months of operation, then Once per quarter afterwards, and will include a total of six PM inspections.
 - (a) Inspections shall include:
 - (1) Combustion analysis and adjustment if required.
 - (2) Adjustment of temperature controls if required to maintain correct inlet temperatures.
 - (3) Inspection of the fuel trains for proper operation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Horizontal, Fire Tube Boilers
 - a. Cleaver-Brooks Inc.
 - b. Hurst Boiler & Welding Co., Inc.
 - c. Superior Boiler Works
 - d. Or Engineer approved equal

2.2 SCHEDULE

MARK	40:W5-BLR-1R (PHASE 1) 40:W5-BLR-2R (PHASE 1) 40:W5-BLR-3R (PHASE 2)
LOCATION	BOILER ROOM
TYPE	FIRETUBE (HOT WATER)
BASIS OF DESIGN MANUFACTURER/MODEL	CLEAVER BROOKS / CBLE-4D
BOILER HORSEPOWER (HP)	150
INPUT CAPACITY (MBH)	6123
OUTPUT CAPACITY (MBH)	5021
MINIMUM EFFICIENCY (%)	82
GAS (NO _x) EMISSION LEVEL (ppm)	60
DESIGN PRESSURE (PSIG)	125
OPERATING DESIGN PRESSURE (PSIG)	50
SAFTY VALVE SETTING (PSIG)	125
NORMAL OPERATING FLOW (GPM)	500
MINIMUM OPERATING FLOW (GPM)	201
MAXIMUM OPERATING FLOW (GPM)	1005
NORMAL OPERATING TEMPERATURE (° F)	180
MINIMUM OPERATING TEMPERATURE (° F)	160
MAXIMUM OPERATING TEMPERATURE (° F)	190
BLEND PUMP FLOW (GPM)	500
BLEND PUMP HEAD (FT. H ₂ O)	20
BLEND PUMP MOTOR	EC/ 5.6 HP, 480V, 3 PH
FUEL TYPE	NATURAL GAS (1000 BTU/CU-FT.) / DIGESTER GAS (570 BTU/CU-FT.)
NATURAL GAS PRESSURE (PSIG)	2
NATURAL GAS (CFH)	6123
DIGESTER GAS PRESSURE (PSIG)	5
DIGESTER GAS (CFH)	10,743
FLUE DIAMETER (IN)	16
BLOWER MOTOR HORSEPOWER (HP)	7.5
BLOWER MOTOR VOLTAGE	460-3-60

INSURANCE REQUIREMENTS	CSD-1 / FM
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2.3 MAXIMUM ALLOWABLE BOILER DIMENSIONS

BOILER OVERALL LENGTH (INCHES)	196.5
BOILER OVERALL WIDTH (INCHES)	75.5
BOILER OVERALL HEIGHT (INCHES)	87.0
BOILER REAR DOOR SWING CLEARANCE (INCHES)	32.0
BOILER FRONT DOOR SWING CLEARANCE (INCHES)	67.0
BOILER TUBE REMOVAL, FRONT CLEARANCE (INCHES)	127.0
MAXIMUM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FROM FRONT OF BOILER (INCHES)	308.0

2.4 HORIZONTAL, FIRE TUBE BOILERS

- A. Description: Factory-fabricated, -assembled, and -tested, horizontal, fire-tube boilers with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket, flue-gas vent, water supply and return connections, and controls.
- B. Pressure Vessel Design: Straight, steel tubes rolled or welded into steel headers. Four or three passes with dry-back design. Minimum heat-exchanger surface of 5 sq. ft./bhp. Include the following accessories:
 - 1. Handholes for water-side inspections.
 - 2. Lifting lugs on top of boiler.
 - 3. Minimum NPS 3/4 hose-end drain valves at shell low point.
 - 4. Tappings or flanges for supply- and return-water piping.
 - 5. Air Vent connection
- C. Front and Rear Doors:
 - 1. Davited, sealed with heat-resistant gaskets and fastened with lugs and cap screws.
 - 2. Designed so tube sheets and flues are fully accessible for inspection or cleaning when doors are open.
 - 3. Include observation ports in doors at both ends of boiler for inspection of flame conditions.
 - 4. Door refractory and insulation shall be accessible for inspection and maintenance.
- D. Casing:
 - 1. Minimum 2-inch-thick, mineral-fiber insulation surrounding the boiler shell and secured in place to prevent sagging or displacement.
 - 2. Flue Connection: Flange at top of boiler.
 - 3. Painted Jacket: Sheet metal, with screw-fastened closures with a nominal thickness: not less than 0.048 in.
 - 4. Mounting base to secure boiler to concrete base.
 - a. Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces defined in paragraph 1.2.C when mounting base is anchored to building structure.
 - 5. Control Compartment Enclosure: NEMA 4X 316 Stainless Steel

2.5 FORCED DRAFT BURNER

- A. Burner:
 - 1. The burner shall be designed for non-simultaneous operation on natural gas fuel and Digester Gas.
 - a. Digester gas characteristics are included in Attachment 1 of this Section.
 - b. Maximum allowable sound level: 83dba measured on the boiler centerline 4-1/2 feet vertically above the bottom of the base rails and 3 feet horizontally in front of the end of the blower motor or front surface of the electrical cabinet.
 - 2. Integral front head design burner:
 - a. Integral Front Head Design

- 1) Single-piece front door and Fan cassette assembly for easy access to fan and motor
 - 2) High radiant multi-port type for gas.
 - b. Motors: NEMA MG 1, Design B, energy efficient as defined in NEMA MG 1. Motors with variable speed control shall be compatible with speed controller.
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 3. Provide low and high gas pressure interlocks for boilers greater than 2.5 MMBtuh by means of FM Approved pressure switches or transmitters arranged to shut off and lock out all fuel and electric ignition in the event of dangerously low or high pressures. Low and high gas pressure interlocks are required for boilers less than 2.5 MMBtuh if provided with a direct spark or hot surface ignition but are optional with pilot ignition. Set the switches within the turndown or safe operating range of the burner. Locate the switches or transmitters between the pressure regulator and safety shutoff valves. Alternatively, the high pressure switch or transmitter can be located downstream of the safety shutoff valves, as shown in the figure above. Account for pressure drops in the fuel train when setting the low- and high-pressure interlocks.
- B. Natural and Digester Gas Train:
1. Control devices and modulating control sequence shall comply with requirements in
 - a. ASME CSD-1
 - b. FMG (Factory Mutual Global)
 - c. UL
- C. Digester Gas train:
1. The following items included in this boiler package must be designed and manufactured of a corrosion resistant alloy for use with digester gas.
 - a. 316 Stainless Steel piping for gas train
 - b. Varec Model 246 (or engineer approved equal) Low Pressure Manual Drip Trap
 - c. Flame arrestor
 - d. Provide two safety shutoff valves (SSOV) both with proof of closure. The SSOV must be resistant to corrosion and compatible with digester gas fuel.
- D. Pilot:
1. Gas Pilot - The gas pilot shall be a premix type with automatic electric ignition. An electronic detector shall monitor the pilot so that the primary gas valve cannot open until pilot flame has been established. The pilot train shall include two manual shut-off valves, solenoid valve, pressure regulator and pressure gauge.

2.6 HOT WATER BOILER TRIM

- A. Include devices sized to comply with
 1. ANSI B31.1, "Power Piping"
 2. ANSI B31.9, "Building Services Piping"
- B. Temperature Transmitter for modulating input to the PLC boiler control. Safety Relief Valve: ASME rated.
- C. Pressure and Temperature Gauge: Minimum 3-1/2-inch- diameter, combination water-pressure and -temperature gauge. Gauges shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
- D. Boiler Air Vent: Manual.
- E. Drain Valve: Minimum NPS 1 hose-end gate valve.
- F. Provide Sample Cooler: Furnished for field installation, with needle valve for each connection. Constructed of Type 316 stainless steel.
 1. Provide factory installation of sample cooler.

- G. Blend Pump: Provide blend pump furnished for field installation with disconnect, capacity as scheduled. Blend pump features shall include:
1. Electronically commutated motor with integral speed control or variable frequency drive integral to motor. Speed control signal compatible with boiler control. See Division 26 section 26 2924 "Electronically Commutated Motors".
 2. Maximum working pressure 225 PSI or greater.
 3. Maximum fluid operating temperature 248 degrees F.
 4. Cast iron cataphoresis coated or cast bronze casing.
 5. Composite (PPS-GF40) or cast bronze impeller,
 6. Stainless steel shaft
 7. Integrally lubricated mechanical seal.

2.7 CONTROLS

- A. Controls shall be compatible with owners existing control system. Manufacturer shall coordinate with owner's requirements for communication and protocol. See Instrumentation drawing 40 I-402 for additional information.
- B. Existing boiler Master Control Panel will be used to enable the boilers and equalize the run times of the three boilers.
- C. Boiler Operation: Equip each boiler with integral controls and a single Control Panel for each boiler. To provide multiple boiler operation, each Control Panel will provide the following functions:
1. Accept enabling and set point signals from the Master Control Panel.
 2. Operate the boiler maintaining an internal water temperature at set-point while not in service as "in-use" (hot standby) to minimize disruption of service in the event of single boiler failure.
 3. Configure controls so any boiler can be taken out of service with power disconnected and not impact multiple boiler operation.
- D. Boiler operating controls shall include the following devices and features:
1. Control transformer with fuse protection, as required by manufacturer, to implement requirements indicated. Provide transformer with 20 percent spare capacity.
- E. Temperature Control for Hot Water Boilers:
1. Operating Limit Control: Factory wired and mounted to control boiler to maintain boiler at constant temperature (auto reset).
 2. High Limit Cutoff: Factory wired and mounted to stop burner if operating conditions rise above normal operating set point (manual reset).
 3. Firing Rate Control: Factory wired and mounted used to change the burner-firing rate to adjust to water temperature requirements.
- F. Water-Level Control for Hot Water Boilers:
1. Low Water Cutoff: A low water cutoff control (manual reset) shall be mounted on the top centerline of the boiler wired into the burner control circuit, to prevent burner operation if boiler water falls below a safe level.
- G. Boiler Emergency Shutdown: Interlock with field-installed boiler emergency shutdown switch to shut down boiler when activated.
1. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for emergency conditions.
- H. Burner Flame Safeguard Controls:
1. Factory equipped with flame safeguard control and infrared flame scanner.
 2. Microprocessor-based, solid-state control having sequence and flame-on visual indication and fault code indications of flame safeguard trip functions.
 3. Control shall include dynamic self-check logic.
 4. Control shall have a fixed operating sequence incapable of being manually altered that includes start, prepurge, pilot and main fuel ignition run, and postpurge cycles.

- a. Ensure that the that all purge cycles are for 4 volume changes at an average of 50% max air flow.
 5. Control shall be non-recycle type for maximum safety that shall shut down the burner and indicate, as a minimum, the following trip functions:
 - a. Pilot and main flame failure.
 - b. High- and low-fire proving switch faults.
 - c. Running interlocks open.
 - d. False flame signal and fuel valve open.
 6. Control shall include a run/test switch to allow interruptions to sequence just after prepurge and during pilot ignition trial, and run cycles for adjustments to firing rate motor, damper linkages, and pilot flame for minimum turndown tests.
- I. Combustion-Air Controls: Factory equipped with motor-operated combustion-air damper and blower control to regulate burner fire according to load demand.
- J. Monitoring and Interface
1. Direct Digital Control System Interface: Factory install hardware and software to enable system to monitor, control, and display boiler status and alarms.
 - a. Communication Interface: Communication interface shall enable control system operator to remotely control on/off and capacity of boiler and monitor the boiler operation from an operator workstation. Control features are available, and monitoring points are displayed locally at boiler-control panel through the interface.
 - 1) Communication protocol must be coordinated with owner's site-specific requirements. Rockwell Ethernet IP is preferred. MODBUS RTU/IP may be used for boiler devices if required.
 - 2) Provide an Allen Bradley Stratix Managed Switch for Ethernet communication internally and to the plant PLC-SCADA system.
- K. Integrated Boiler-Control System:
1. Integral control of burner management for flame safety, boiler modulation, and operator interface functions with features and functions indicated.
 2. Factory preconfigured.
 3. Utilizing an Allen-Bradley AB 5380-L330ER (3MB) PLC based controls and sensors to provide various control functions, including the following:
 - a. Automatic sequencing of the boiler through standby, pre-purge, pilot flame establishing period, main flame establishing period, run, flame proving and lockout, and post-purge.
 - b. Full modulating control of air and fuel through Proportional-Integral-Derivative (PID) algorithm.
 - c. Thermal shock protection.
 - d. High and low limit alarms and shutdowns.
 4. Local operator interface through a PanelView AB 5000 Touch Screen 10" (24VDC) color touch screen graphical display for setup, monitoring, and data acquisition.
 - a. Manual control of the boiler firing rate using control screens to increment or decrement firing rate.
 - b. Indication of burner management controller status and diagnostics.
 - c. Display of system alarms and faults.
 - d. Display of history of alarms and faults.
 - e. Display of recommendations for troubleshooting of fault conditions.
 - f. Display of water-level indication and alarm(s).
 - g. Display of boiler inlet and outlet water temperatures
 - h. Stack flue-gas, combustion-air, and shell water-temperature indication.
 - i. Blend pump run status, speed and fault status.
 - j. Boiler recirculation pump run status, speed and fault status and isolation valve position status.
 - k. Boiler efficiency calculation and display.
 - l. Low-fire hold with minimum temperature control.
 - m. Assured low-fire cutoff (ALFCO).
 - n. High stack temperature annunciation with auto cutoff.
 - o. Audible alarm and silencing through touch screen intervention.
 - p. Inlet and discharge water temperatures to and from economizer.

- q. Inlet and discharge stack temperatures to and from economizer.
- 5. Fully integrated control of the following:
 - a. Blower operation and combustion-air damper for varying operating conditions.
 - b. Parallel positioning for independent fuel and air control for enhanced fuel efficiency.
 - c. Boiler hot standby control.
- L. Digester Gas (DG) Operation Specific Programming
 - 1. Automatic Fuel Changeover – Utilizing Hawk 4000 and DG Pressure Transmitter:
 - a. The selection of fuel source is controlled by the Hawk PLC.
 - b. The operator shall have visibility and control of the process from Hawk HMI.
 - c. The customer's control system (, SCADA, PLC, etc.) can select fuel firing source with additional programming and Remote Fuel Selection Mode.
 - d. Hardware:
 - 1) Digester gas pressure transmitter. Shipped loose with directions to be installed upstream of DG pressure regulator.
 - 2) PLC I/O modules 5069-IA16, 5069-OA16, 5069-IF8, 5069-OF8, with interposing relays for digital outputs and wiring factory mounted.
 - e. HMI operator selection modes:
 - 1) Natural Gas
 - 2) Digester Gas
 - 3) Automatic Fuel Changeover
 - 4) Description of operation:
 - (a) When fuel selection is automatic, the fuel selection will be based on the digester gas pressure and the pressure setting on the Hawk 4000 HMI touch screen. If the boiler is firing digester gas and the DG pressure drops below HMI pressure setting for a period of time greater than the time delay setting (HMI set-point), the boiler will go to low fire, shut down, the post purge. The boiler will then pre-purge, light off on natural gas, and continue firing natural gas until the digester gas pressure rises above the pressure setting of the of the Hawk HMI. Once the digester pressure rises above the pressure setting for a period of time greater than the time delay setting (HMI set-point), the boiler will drive to low fire, perform a post-purge, then pre-purge and light off on digester gas. The digester gas firing always takes precedence.
 - 2. Include the following Hawk 4000 PLC/Processor Features
 - a. Processor: CompactLogix 5380 L330ER (3MB) HMI: AB PanelView5000 Touch Screen 10" (24 VDC)
 - b. UL Listed: Yes
 - c. Burner Control: Honeywell CB780
 - d. O2 Trim Control
 - e. Parallel Positioning
 - f. 3rd Fuel Parallel Positioning
 - g. Variable Speed Drive
 - h. Draft Control
 - i. Single Point Positioning/Jackshaft
 - j. Full Metering Capabilities
 - k. Stack Temp with High Cutoff Set Point
 - l. Thermal Shock Protection
 - m. Additional User Analog Inputs
 - n. Combustion Air/Ambient Temperature
 - o. Dual Set Points
 - p. Stack Loss Boiler Efficiency Reading
 - q. Hot Stand By
 - r. E-mail, Text Messaging Via Internet
 - s. Building Automation Interface
 - t. Remote Monitoring by Boiler / Plant SCADA System
 - u. Water Level Display Capabilities
 - v. Local On-Screen Trending
 - w. Alarm History

- x. Water Level Control 1, 2 or 3 Element

- M. Inlet Water Temperature Control:
 - 1. Primary Circulation Control:
 - a. Upon a start signal from the facility control system the boiler control system shall:
 - 1) Send a signal to open the dedicated boiler isolation valve (valve provided under a separate contract)
 - 2) Send a signal to energize the dedicated boiler primary pump (pump provided under a separate contract)
 - b. Upon a stop signal from the facility control system the boiler control system shall:
 - 1) Send a signal to deenergize the dedicated boiler primary pump.
 - 2) Send a signal to close the dedicated boiler isolation valve.
 - 2. Temperature Control: The control system shall control a variable speed blend pump to maintain the minimum inlet temperature required by recirculating water from the boiler outlet to the boiler inlet.
 - a. Operation: Burner Switch ON will initiate a Start Command. PLC digital output will energize to command Pump Start. Auxiliary contact will be wired to PLC input to Confirm Pump Running. If pump is not proved, running the Boiler will be shutdown via software. No H-O-A Pump switch required, since blend pump running is Boiler run permissive function only.
 - b. The control system will provide user adjustable Delta T alarm based on user entry should the Delta T temperature exceed the user adjustable limit (Delta T too Large) an alarm will be triggered for operator notification only. No other action on alarm.

2.8 CONTROL ENCLOSURES:

- A. NEMA Type 4X 316 SS
 1. Provide enclosure with, heater, and air conditioner to automatically control temperature inside enclosure within safe operating limits of devices installed within the enclosure.
 2. Boiler room environmental conditions will be controlled to 45 degrees F minimum. and 109 degrees F maximum (based upon ambient conditions ASHRAE 99.6% heating design and 0.4% cooling design at Peachtree Dekalb AP).
- B. Mounted on boiler assembly at a location convenient to operator.
- C. Provide hinged full-size door with latch and closure.
- D. Enclosure shall consist of multiple sections divided by a partition with a separate hinged door for each section. One section shall house low-voltage controls and other section shall house line voltage controls.
- E. Enclosure shall house the following:
 1. Control transformers with fuses.
 2. Labeled terminal strips.
 3. Controller(s) to provide control and alarm functions indicated.
 4. Audible indication of safety alarms.
- F. Face of enclosure shall provide the following:
 1. Visual indication of operating components and alarms (OIT).
 2. Auto/local capability to allow operator to manually operate boiler locally.
 3. Audible alarm-silence capability.
 4. Labels for switches, lights, and displays to provide clear indication of service.
- G. Control Instrument Enclosures: Control instruments and devices that are mounted on the boiler assembly and cannot be installed inside the control enclosure shall have same or higher level of protection indicated for control enclosures.
- H. Control Cable and Wire:
 1. Control cable and wiring shall be numbered and color-coded to match wiring diagram.
 2. Install cable and wiring located outside of enclosure(s) in a metal raceway. Use flexible conduit to make final terminations.

2.9 ELECTRICAL POWER

- A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections shall meet NEC (NFPA-70) requirements.
- B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
 1. House in NEMA 4X 316 enclosure.
 2. Wiring shall be numbered and color-coded to match wiring diagram.
 3. Install wiring outside of an enclosure in a metal raceway.
 4. Field power interface shall be:
 - a. Non-fused disconnect switch
 5. Provide branch power circuit to each motor and to controls with a disconnect switch and/or circuit breaker.
 6. Provide each motor with overcurrent protection.
 7. Provide Allen Bradley 1609D series DIN rain mounted uninterruptible power supply for boiler control package during power outages of 30 minutes.
 8. Provide transformer with fuses and power wiring to power a 20-A 120-V duplex receptacle mounted in each boiler control panel for use in connecting analytical and testing equipment.
 9. Provide UL Type 1 surge protection device PEPPERL+FUCHS K-LB-2.20G to the incoming power feed.

2.10 SPARE PARTS

- A. Provide the following spare parts:
 - 1. One complete air compressor
 - 2. One actuated valve for each type of actuated valve included
 - 3. One blend pump complete with Electronically Commutated Motor
 - 4. One temperature probe
 - 5. One natural gas and one digester gas pressure gauge
 - 6. One oxygen sensor for flue stack
 - 7. One spare door
 - 8. Door gasket materials

2.11 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
- B. Burner and Boiler Package Shop Test:
 - 1. Factory mount the burner to the boiler and test equipment at low fire.
 - 2. The complete packaged boiler shall receive factory tests to check construction and function of all controls
- C. Allow Owner access to source quality-control testing of boilers. Notify Owner and Engineer 14 days in advance of testing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
 - 1. Final boiler locations indicated on Drawings are approximate. Manufacturer to review and approve installing contractor's installation drawings before roughing-in for piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed.
- C. Inform contractor it is acceptable to proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

- A. Install and connect the boilers in accordance with the manufacturer's recommendations.
- B. Install level on concrete base. Installation complies with listing, certifications, and all manufacturer's requirements.
- C. Vibration Isolation installation: Installation complies with listing, certifications, and all manufacturer's requirements.
- D. Install in accordance with manufacturer's requirements, requirements of the International Fuel Gas Code 2018 and requirements of NFPA 54 National Fuel Gas Code as adopted by the authority having jurisdiction.
- E. Boiler trim assembled and installed in accordance with manufacturer's requirements and equipment listing.
- F. Electrical devices furnished with boiler but not specified to be factory mounted are installed in accordance with manufacturer's requirements.

- G. Control wiring to field-mounted electrical devices installed in accordance with manufacturer's requirements.

3.3 CONNECTIONS

- A. Confirm piping installation requirements are installed in accordance with manufacturer's requirements, listing, certifications and applicable codes. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Confirm piping adjacent to boiler to allow service and maintenance is in accordance with manufacturer's requirements and listing.
- C. Confirm natural gas and digester gas piping to boiler gas-train inlets is installed per manufacturer's requirements.
- D. Hot Water Boilers: Confirm the following:
 - 1. Connections of hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.
 - 2. Piping from safety relief valves to nearest floor drain.
- E. Confirm piping from equipment drain connection to nearest floor drain is in compliance with boiler manufacturer's requirements
- F. Confirm breeching full size to boiler outlet complies with manufacturer's requirements. Comply with all applicable listing and code requirements for boilers.
- G. Confirm grounding equipment according to manufacturer's requirements all applicable listing and code requirements for boilers s.
- H. Confirm wiring is installed according to boiler manufacturer's requirements, all applicable listing and code requirements for boilers.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and perform factory recommended start-up tests and start-up service.
 - 2. Installation will occur in multiple phases. Include services for testing, inspection, field service and commissioning assistance for each boiler to be installed, tested, and commissioned individually. In addition, include testing for all boilers as a system in coordination with the installing contractor.
- B. Tests and Inspections:
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratios and combustion for all fuel sources.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.
 - b. Check and adjust initial operating set points and high- and low-limit safety set points of fuel steam pressure.
 - c. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Post-Owner Turnover Adjustments: When requested within 12 months of date of Substantial Completion, as defined in this Part, provide on-site assistance in adjusting system to suit actual utilization conditions. Provide up to two visits to the Project at any time at the owner's convenience for this purpose.

- E. Substantial Completion—The time at which the work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents to provide the following: (i) the Owner full time, uninterrupted, continuous operation of the specified equipment and ancillary components; and (ii) all required functional, performance, and operational or startup testing has been successfully demonstrated for all components, devices, equipment, and systems to the satisfaction of the Engineer in accordance with the requirements of the Specifications; and (iii) all required inspections and other work necessary for the Engineer to certify “substantially complete” have been completed.

3.5 DEMONSTRATION AND TRAINING

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain boilers. Provide video of training sessions in DVD format and turn over three disks to Owner in addition to printed manuals. Training is to include multiple sessions that cover three (3) shifts of operations.
- B. Instruction Program: Submit outline of instructional program for demonstration and training, and a schedule of proposed dates, times, length of instruction time, and instructors' name.
- C. Instructor Qualifications: Factory-authorized service representative experienced in operation and maintenance procedures and training.
- D. Training Requirements: Include instruction for the following as applicable to the system, equipment or component:
1. Basis of System Design, Operational Requirements, and Criteria:
 - a. System, subsystem, and equipment descriptions.
 - b. Operating standards.
 - c. Regulatory requirements.
 - d. Equipment function.
 - e. Operating characteristics.
 - f. Limiting conditions.
 2. Documentation: Review the following items in detail.
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 3. Emergencies:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 4. Operations:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.

- h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Economy and efficiency adjustments.
 - 6. Troubleshooting:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
 - 7. Maintenance:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
 - 8. Repairs:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.
- E. Training Location and Reference Material: Conduct training on-site using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

3.6 COMMISSIONING ASSISTANCE

- A. Engage a factory-authorized service representative to be present during commissioning and assist in commissioning activities as required by the Owner or Owner's representative.
- B. Commissioning will occur in multiple phases. Provide commissioning assistance for the duration of the project. Assume that each boiler will constitute a phase of construction. Include as a minimum for each boiler: Participation on 2 pre-commissioning meetings, 2 commissioning construction administration site observations, 2 days of on-site performance validation.
- C. Corrections to deficiencies identified during the commissioning process shall be completed and demonstrated prior to consideration of Substantial Completion of each phase.

3.7 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. The following form must be filled out after each onsite inspection to document that the installation was performed per manufacturer's recommendations:

Form 01-4000-A Manufacturer's Certificate of Proper Installation

Owner: GWINNETT COUNTY DWR	
Gwinnett Project #:	
Equipment/System:	Model #:
Tag #:	Serial #:
Equipment Manufacturer:	

I hereby certify that the above-referenced equipment/system has been (check applicable):

- Installed in accordance with Manufacturer's recommendations.
- Inspected, adjusted, properly aligned and is free from undue stress from piping or anchor bolts.
- Serviced with proper initial lubricants.
- Electrical and mechanical connections are complete and meet quality and safety standards.
- All applicable human and/or equipment safety devices have been properly installed.
- The equipment is ready to operate under full load conditions.

Comments:
I, the undersigned Manufacturer's Representative, hereby certifies that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, commission, and operate this equipment and (iii) authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.
Date:
Manufacturer's Authorized Rep. Printed Name:
Manufacturer's Authorized Rep. Signature: _____

INSTALLER'S CHECKLIST FOR AUTOMATIC-LIGHTED BOILER SAFETY COMBUSTION CONTROL SYSTEM



NOTE: This checklist does not apply to pressure parts of the boiler, steam and water piping, valves, etc., and does not supersede any statutory regulations of any city, county, state or province. User should contact his boiler inspector.

PART A – PLANS:

INSTALLER'S NAME & ADDRESS		CONTRACT OR JOB NUMBER	DATE PART "A" SENT TO FM GLOBAL:	INDEX NO.
CUSTOMER (OWNER) NAME & ADDRESS			DATE CONTRACT SIGNED BY CUSTOMER:	OPERATIONS CTR.
BOILER LOCATION: (BUILDING NAME/NUMBER)		<input type="checkbox"/> BASEMENT <input type="checkbox"/> GROUND FLOOR	FLOOR NUMBER	TOTAL NO. OF FLOORS
BOILER MAKE/MODEL NUMBER		BOILER MAXIMUM FUEL BTU/HOUR INPUT: GAS: _____ OIL: _____		
FUELS MAIN BURNER: <input type="checkbox"/> NATURAL GAS <input type="checkbox"/> LP GAS <input type="checkbox"/> FUEL OIL NO. <input type="checkbox"/> HEATED <input type="checkbox"/> UNHEATED			<input type="checkbox"/> GAS <input type="checkbox"/> OIL NO. <input type="checkbox"/> SPARK IGNITED	
MAIN & PILOT BURNER(S): MAKE & MODEL NUMBER(S)		MAKE & MODEL NO. IF HIGH ENERGY ELECTRIC IGNITOR USED FOR DIRECT IGNITION OF MAIN OIL BURNER:		
FLAME SAFEGUARDS & FLAME SENSING ELEMENTS – MAKE & MODEL OF EACH			BURNER OBSERVATION PORTS? <input type="checkbox"/> YES <input type="checkbox"/> NO	
TRIAL-FOR IGNITION GAS: _____ SEC. _____ MAIN BURNER OIL: _____ SEC. _____		PILOT BURNER FLAME ESTABLISHED PERIOD GAS: _____ SEC. OIL: _____ SEC.		
HIGH & LOW GAS PRESS. INTERLOCKS MAKE/MODEL OF EACH			LOW OIL PRESSURE	
MAIN BURNER GAS SAFETY SHUT-OFF VALVE (S) (MBGSSOV) MAKE/MODEL NO(S):		MAIN BURNER OIL SAFETY SHUT-OFF VALVE(S) (MBOSSOV) MAKE/MODEL NO(S):		
PILOT BURNER GAS SAFETY SHUT-OFF VALVE - MAKE/MODEL NO(S):		PILOT BURNER OIL SAFETY SHUT-OFF VALVE(S) (MBOSSOV) MAKE/MODEL NO(S):		
MBGSSOV PROVED CLOSED BEFORE & DURING PRE-IGNITION PURGE*		MBOSSOV PROVED CLOSED BEFORE & DURING PRE-IGNITION PURGE*		
LEAK TEST MEANS PROVIDED FOR MAIN GAS SAFETY SHUT-OFF VALVE(S):		STRAINERS, DRIPPOTS, TRAPS, ETC. UPSTREAM MAIN FUEL SAFETY SHUT-OFF VALVE(S) :		
BOILER AIR CHANGES IN PURGE <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8		PURGE AIR RATE AT LEAST 50% AVERAGE OF MAXIMUM <input type="checkbox"/> FIRING RATE <input type="checkbox"/> OTHER _____ % MAX.		COMB. AIR FAILURE INTERLOCK(S): MAKE/MODEL NO(S).
LOW FIRE START? <input type="checkbox"/> YES <input type="checkbox"/> NO	LOW OIL TEMPERTAURE INTERLOCK – MAKE/MODEL NO. <input type="checkbox"/> YES <input type="checkbox"/> NO		LOW ATOMIZING STEAM INTERLOCK? <input type="checkbox"/> YES <input type="checkbox"/> NO	
LOW ATOMIZING AIR INTERLOCK – MAKE/MODEL NO. <input type="checkbox"/> YES <input type="checkbox"/> NO		LOW DIFFERENTIAL OIL/ATOMIZING MEDIA INTERLOCK – MAKE/MODEL NO. <input type="checkbox"/> YES <input type="checkbox"/> NO		
ACCESSIBLE EMERGENCY BOILER FUEL SUPPLY(S) MANUAL SHUT-OFF VALVE(S) PROVIDED? <input type="checkbox"/> YES <input type="checkbox"/> NO		FUSIBLE LINKS FUEL SHUT-OFF VALVE(S) PROVIDED IN BOILER OIL SUPPLY? <input type="checkbox"/> YES <input type="checkbox"/> NO		
LOW WATER LEVEL FUEL CUTOFF(S) (LWFC)? <input type="checkbox"/> YES <input type="checkbox"/> NO NUMBER PROVIDED <input type="checkbox"/> ONE <input type="checkbox"/> TWO		HIGH WATER TEMPERATURE FUEL TRIP? <input type="checkbox"/> YES <input type="checkbox"/> NO		HIGH STEAM PRESS. FUEL TRIP <input type="checkbox"/> YES <input type="checkbox"/> NO
LWFC(S) – MAKE/MODEL NO(S).		LOW WATER ALARM? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> AUDIBLE <input type="checkbox"/> VISUAL		AUTO. FEEDWATER REG.? <input type="checkbox"/> YES <input type="checkbox"/> NO
OTHER DATA/COMMENTS:				

PART B – INSTALLER'S INSPECTION & TEST OF COMPLETED SAFETY COMBUSTION CONTROL SYSTEM:

- Automatically controlled draft dampers and burners adjusted for smooth lighting off and stable flame at all firing rates.
- All controls adjusted and tested for proper response.
- Flame sensing element supervises pilot at a point where it will reliably ignite main burner.
- Emergency fuel supply shutoff valves properly installed, identified.
- Adequate fresh air openings for combustion air into boiler room.
- Customer's operator instructed.
- Printed operating instructions left.
- Application blank with Part "B" signed & completed left with customer for posting at boiler.

SIGNED: INSTALLER'S FIELD REPRESENTATIVE	TEST WITNESSED FOR CUSTOMER (BY)	DATE:
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PART C – FM GLOBAL FIELD EXAMINATION OF COMPLETED SAFETY COMBUSTION CONTROL SYSTEM:

- Plans Checked
- Installer's Inspection & Test of Completed Safety Combustion Control System Checked
- Safety Controls Tested Date: _____

INSTALLER'S CHECKLIST FOR AUTOMATIC-LIGHTED BOILER SAFETY COMBUSTION CONTROL SYSTEM



The liability to FM Global is limited to that covered by its insurance policies. No other liability is assumed by reason of this report.

INSTRUCTIONS TO INSTALLER:

1. Fill out Part A and submit copy to the nearest FM Global Operations Center.
2. Fill out Part B at customer location and leave with customer.

-
- **Valves which permit supervision of closed portion (valve seal over-travels to actuate an interlock) are shown by a double dagger with a valve make and model number in the listings in the Factory Mutual Research Approval Guide and are highly recommended with a gas boiler or an oil boiler having fuel BTU per hour rating 12,500,000 or over for proving valve is closed before and throughout re-ignition purge.**
 - ** **Generally two (2) low water cutoffs are required for automatically fired steam boilers, low water cutoffs should be Factory Mutual Research approved, separately piped, connected electrically in series, and preferably uses two different operating principles (e.g. float type or probe type).**
-

GLOSSARY:

An automatic-lighted boiler is one where fuel to the main burner is turned on automatically by means of automatic pressure – or temperature controlled devices.

Prior to turning on the fuel to the main burner, the control arrangement automatically provides either an electric ignition source of electric-ignited pilot flame, or the main burner has a continuous-burning manually lighted pilot.

The term combustion (flame) safeguard to control a device which senses the presence of flame and will cause fuel shut-off in the event of flame failure by causing the safety shut-off valve to close. It may sound an alarm and be of the programming type.

A supervised flame is a flame whose presence or absence is detected by a combustion safeguard.

A proved pilot is a pilot flame supervised by a combustion safeguard which senses the presence of the pilot flame prior to permitting the main burner fuel safety shut-off valve to open.

A programming combustion safeguard on lighting off, turns on the ignition system, determines the length of time it is on and when the pilot and main fuel valves open. On failing to sense the flame, all fuel is shut off and locked out.

The trial-for-ignition period is defined as that period of time the programming combustion safeguard permits the main burner fuel valve to be open before the main flame sensing device is required to detect the main flame. If the main flame is not detected, all fuel is shut off and locked out immediately and there is no further ignition attempt.

A continuous pilot can only be lighted by the fireman and burns without turndown throughout the entire time the boiler is in service, whether the main burner is firing or not.

An interrupted pilot is electrically ignited automatically each time there is a call for heat. The pilot fuel is usually cut off automatically for programming combustion safeguard at the end of the trial-for-ignition period of the main burner, so that the main flame supervision must begin.

An intermittent pilot is electrically ignited automatically each time there is a call for heat. It burns during the entire time the main burner fires and is shut off with the main burner at the end of the call for heat.

Safe-start component check is a checking circuit, usually built into the combustion safeguard, which prevents lighting off if the combustion safeguard is in an unsafe condition.

**F. Wayne Hill Water Resources Center
Boilers and Hot Water Supply Pumps Replacement
DWR Project # M1190-49
Gwinnett County, Georgia
Gresham Smith Project No.: 45483.15**

ISSUED	DATE
ISSUED FOR BID	August 31, 2023
REVISION 1	October 30, 2023

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END OF SECTION