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SECTION 00320  
REQUIRED BID INFORMATION

PACKAGED WATER TUBE STEAM BOILER

1.01 SCOPE: The information requested on the following pages is required to be submitted with the completed bid forms. All information is required in order to properly evaluate each proposal. Each proposal will be evaluated using the information and methodology outlined below.

1.02 EVALUATION CRITERIA:

- A. Proposals will be evaluated on the initial cost of the equipment and compliance with the requirements of the Purchase Agreement.
- B. The specifications establish the minimum requirements required for furnishing the boiler specified. Equipment exceeding these requirements will be evaluated based on the specified value and credit given as appropriate. Likewise, equipment that does not meet or exceed the specified values will be evaluated accordingly.

1.03 MANUFACTURER:

- A. Manufacturer: The Seller shall state the manufacturer's name and catalog number (where applicable) of materials and equipment upon which this bid is based.
  - 1. The use of the terms "or equal" or "as specified" by the Seller in this bid evaluation form is not acceptable and will be considered nonresponsive.
  - 2. This proposal is based on materials and equipment from the following manufacturers, and the Seller proposes to furnish the following items:

	<u>Name of Manufacturer</u>	<u>Identification Model or Type</u>
Packaged Water Tube Steam Boiler	_____	_____
Economizer	_____	_____
Forced Draft Fan	_____	_____
Dual Fuel Burner Assembly	_____	_____
Induced Flue Gas Recirculation System (Alternate No. 1)	_____	_____



11. Boiler efficiency firing specified #2 fuel oil at 15% excess air without economizer \_\_\_\_\_ %
12. Boiler efficiency firing specified #2 fuel oil at 15% excess air with economizer \_\_\_\_\_ %
13. Boiler efficiency firing specified natural gas at 15% excess with Alternate No. 1 induced flue gas recirculation system \_\_\_\_\_ %
14. Boiler efficiency firing specified #2 fuel oil at 15% excess with Alternate No. 1 induced flue gas recirculation system \_\_\_\_\_ %
15. Boiler continuous blowdown rate at stated efficiencies \_\_\_\_\_ %
16. Gas burner turndown ratio at design gas pressure \_\_\_\_\_
17. Boiler effective projected radiant surface (EPRS) calculated as specified \_\_\_\_\_ BTU/ ft<sup>2</sup>
18. Boiler furnace volume (FV) calculated as specified \_\_\_\_\_ BTU/ ft<sup>3</sup>
19. Boiler overall operating dimensions with economizer
  - Length \_\_\_\_\_ ft.-in.
  - Width \_\_\_\_\_ ft.-in.
  - Height \_\_\_\_\_ ft.-in.
20. Boiler shipping weight \_\_\_\_\_ lbs.
21. Boiler operating weight \_\_\_\_\_ lbs.
22. Boiler manufacturer's recommended stack diameter for 16 ft high stack from horizontal flue connection \_\_\_\_\_ in.

**B. Economizer:**

1. Economizer overall operating dimensions (horizontal gas flow)
  - Length \_\_\_\_\_ ft.-in.
  - Width \_\_\_\_\_ ft.-in.
  - Height \_\_\_\_\_ ft.-in.
2. Economizer shipping weight \_\_\_\_\_ lbs.
3. Economizer operating weight \_\_\_\_\_ lbs.
4. Economizer water tube diameter \_\_\_\_\_ in. O.D.

- 5. Soot blower lane width, center to center of tubes \_\_\_\_\_ in.
- 6. Economizer design entering flue gas temperature \_\_\_\_\_ deg. F
- 7. Economizer design entering feedwater temperature \_\_\_\_\_ deg. F
- 8. Economizer design feedwater flow rate \_\_\_\_\_ gpm
- 9. Economizer design feedwater temperature rise \_\_\_\_\_ deg. F
- 10. Economizer heat exchange at design conditions \_\_\_\_\_ BTUH
- 11. Economizer feedwater pressure drop at design conditions \_\_\_\_\_ ft. w.g.
- 12. Economizer flue gas pressure drop at design conditions \_\_\_\_\_ in. w.g.
- 13. Economizer leaving flue gas temperature at design conditions \_\_\_\_\_ deg. F

C. Forced Draft Fan:

- 1. Fan design air flow at full load conditions \_\_\_\_\_ SCFM
- 2. Fan static pressure at full load conditions \_\_\_\_\_ in. w.g.
- 3. Fan speed at full load conditions \_\_\_\_\_ rpm
- 4. Fan operating horsepower at full load conditions \_\_\_\_\_ hp
- 5. Motor horsepower \_\_\_\_\_ hp
- 6. Motor volt/phase/Hertz \_\_\_\_\_ / /
- 7. Fan sound pressure data as specified

63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz

Equivalent sound pressure level \_\_\_\_\_ dBA

D. Forced Draft Fan (with Alternate No. 1 Induced Flue Gas Recirculation System):

- 1. Fan design air flow at full load conditions \_\_\_\_\_ SCFM
- 2. Fan static pressure at full load conditions \_\_\_\_\_ in. w.g.
- 3. Fan speed at full load conditions \_\_\_\_\_ rpm
- 4. Fan operating horsepower at full load conditions \_\_\_\_\_ hp
- 5. Motor horsepower \_\_\_\_\_ hp

6. Motor volt/phase/Hertz

\_\_\_\_ / \_\_\_\_ / \_\_\_\_

7. Fan sound pressure data as specified

63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz

Equivalent sound pressure level

\_\_\_\_\_ dBA

END OF SECTION

**SECTION 01010  
SUMMARY OF WORK**

**PART 1 - GENERAL**

- A. The Agreement and applicable portions of the Specifications are a part of this section.
- B. Consult Index to be certain that set of Documents and Specifications is complete. Report omissions or discrepancies to the Architect-Engineer.

**PART 2 - SCOPE OF THE WORK**

The scope of this Contract is the purchase of 60,000 lb/hr, 275 psig packaged water tube steam boiler for the Steam and Chilled Water Plant Upgrade Project at the Steam and Chilled Water Plant at the University of Oklahoma Health Sciences Center in accordance with the Contract and Specifications Section 15625, Packaged Water Tube Steam Boiler, as prepared by Frankfurt-Short-Bruza Associates, P.C. The equipment specified will be purchased by the Health Sciences Center for installation under a future Steam and Chilled Water Plant Upgrade Project contract. The equipment shall be furnished complete with all items included in the specifications.

**PART 3 - LOCATION OF PROJECT**

The boiler purchased under this Contract is scheduled for installation in the future under a separate Steam and Chilled Water Plant Upgrade Project contract at the Steam and Chilled Water Plant of The University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma.

**PART 4 - DRAWINGS AND PICTURES**

- A. Boiler Installation Plan M-1
- B. Boiler Installation Elevation M-2

**PART 5 - DISCREPANCIES**

The Contractor shall in writing, call to the attention of the Architect-Engineer any discrepancies in the Contract Documents. Any difference which may be found shall be submitted to the Architect-Engineer for consideration before proceeding with the work.

**PART 6 - ITEMS FURNISHED BY OTHERS**

Refer to Section 15625 Packaged Water Tube Steam Boiler.

**END OF SECTION**

SECTION 01030  
ALTERNATES

PART 1 - GENERAL

A. Description of Work

1. An Alternate is an amount proposed by Bidders and stated on the Bid Proposal for certain items that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment systems or installation methods described in Contract Documents.
  - a. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted alternate is complete and fully integrated into the Project.
  - b. Notification: Immediately following Contract awards, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates.
  - c. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the Work described under each alternate.
2. Include as part of each alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.

B. Schedule of Alternates

1. Alternate No. 1: Furnish an induced flue gas recirculation system capable of reducing the boiler NOx emissions to 30 ppm in accordance with the requirements of the Contract Documents.

END OF SECTION

SECTION 01730  
OPERATING AND MAINTENANCE DATA

**PART 1 - GENERAL**

**A. Description**

1. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the contract.
  - a. Prepare operating and maintenance data as specified in this section and as referenced in other pertinent sections of Specifications.
2. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

**B. Related Work Specified Elsewhere**

1. Packaged Water Tube Steam Boiler: Section 15625.

**C. Quality Assurance**

1. Preparation of data shall be done by personnel:
  - a. Trained and experienced in maintenance and operation of the described products.
  - b. Completely familiar with requirements of this Section.
  - c. Skilled as a technical writer to the extent required to communicate essential data.
  - d. Skilled as a draftsman competent to prepare required drawings.

**D. Form of Submittals**

1. Prepare data in the form of an instructional manual for use by Owner's personnel.
2. Format:
  - a. Size: 8-1/2 in. x 11 in.
  - b. Paper: 20 pound minimum, white, for typed pages.
  - c. Test: Manufacturer's printed data, or neatly typewritten.
  - d. Drawings:
    - (1) Provide reinforced punched binder tab, bind in with test.
    - (2) Fold larger drawings to the size of the test pages.
  - e. Provide flyleaf for each separate product, or each piece of operating equipment.
    - (1) Provide typed description of product, and major component parts of equipment.
    - (2) Provide indexed tabs.

- f. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS".

List:

- (1) Title of Project.
- (2) Identity of separate structure as applicable.
- (3) Identity of general subject matter covered in the manual.

3. Binders:

- a. Commercial quality three-ring binders with durable and cleanable plastic covers.
- b. Maximum ring size: 1-1/2".
- c. When multiple binders are used, collate the data into related consistent groupings.

E. Content of Manual

1. Neatly typewritten table of contents of each volume, arranged in a systematic order.
  - a. Contractor, name of responsible principal, address and telephone number.
  - b. A list of each product required to be included, indexed to the content of the volume.
  - c. List, with each product, the name, address and telephone number of:
    - (1) Subcontractor or installer.
    - (2) Maintenance contractor, as appropriate.
    - (3) Identify the area of responsibility of each.
    - (4) Local source of supply for parts and replacement.
  - d. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
2. Product Data:
  - a. Include only those sheets which are pertinent to the specific product.
  - b. Annotate each sheet to:
    - (1) Clearly identify the specific product or part installed.
    - (2) Clearly identify the data applicable to the installation.
    - (3) Delete references to inapplicable information.

3. Drawings:
  - a. Supplement product data with drawings as necessary to clearly illustrate:
    - (1) Relations of component parts of equipment and systems.
    - (2) Control and flow diagrams.
  - b. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
  - c. Do not use Project Record Documents as maintenance drawings.
4. Written text, as required to supplement product data for the particular installation.
  - a. Organize in a consistent format under separate headings for different procedures.
  - b. Provide a logical sequence of instructions for each procedure.
5. Copy of each warranty, bond and service contract issued.
  - a. Provide information sheet for Owner's personnel, give:
    - (1) Proper procedures in the event of failure.
    - (2) Instances which might affect the validity of warranties or bonds.

F. Manual for Equipment and Systems

1. Content, for each unit of equipment and system, as appropriate:
  - a. Description of unit and component parts.
    - (1) Function, normal operating characteristics, and limiting conditions.
    - (2) Performance curves, engineering data and tests.
    - (3) Complete nomenclature and commercial number of all replaceable parts.
  - b. Operating Procedures:
    - (1) Start-up, break-in, routine and normal operating instructions.
    - (2) Regulation, control, stopping, shut-down and emergency instructions.
    - (3) Summer and winter operating instructions.
    - (4) Special operating instructions.
  - c. Maintenance Procedures:
    - (1) Routine operations.
    - (2) Guide to "troubleshooting".
    - (3) Disassembly, repair and reassembly.
    - (4) Alignment, adjusting and checking.

- d. Servicing and lubrication schedule with list of lubricants required.
  - e. Manufacturer's printed operating and maintenance instructions.
  - f. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
    - (1) Predicted life of parts subject to wear.
    - (2) Items recommended to be stocked as spare parts.
  - g. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
  - h. Other data as required under pertinent sections of specifications.
2. Content, for each electric and electronic system, as appropriate:
- a. Description of system and component parts.
    - (1) Function, normal operating characteristics, and limiting conditions.
    - (2) Performance curves, engineering data and tests.
    - (3) Complete nomenclature and commercial number of replaceable parts.
  - b. As-installed color coded wiring diagrams.
  - c. Operating Procedures:
    - (1) Routine operations.
    - (2) Guide to "troubleshooting".
    - (3) Disassembly, repair and reassembly.
    - (4) Adjustment and checking.
  - d. Manufacturer's printed operating and maintenance instructions.
  - e. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
  - f. Other data as required under pertinent sections of specifications.
3. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.
4. Additional requirements for operating and maintenance data: The respective sections of Specifications.

**G. Submittal Schedule**

- 1. Submit 2 copies of preliminary draft of proposed formats and outlines of contents prior to start of work. Architect/Engineer will review draft and return one copy with comments.

G. Submittal Schedule

1. Submit 2 copies of preliminary draft of proposed formats and outlines of contents prior to start of work. Architect/Engineer will review draft and return one copy with comments.
2. Submit 1 copy of completed data in final form fifteen days prior to final inspection or acceptance. Copy will be returned after final inspection or acceptance, with comments.
3. Submit 2 copies of approved data in final form 10 days after final inspection or acceptance.

H. Instruction of Owner's Personnel

1. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of the packaged water tube steam boiler and all furnished components as specified in Section 15625.
2. Operating and maintenance manual shall constitute the basis of instruction.
  - a. Review contents of manual with Owner's operations personnel in full detail to explain all aspects of operations and maintenance.
3. Provide a minimum of 16 normal working hours of on-site instruction. Coordinate all instruction with the Owner. Minimum instruction period for one plant shift shall be 4 hours. Instruction shall be provided for 3 plant shifts.

END OF SECTION

SECTION 15625  
PACKAGED WATER TUBE STEAM BOILER

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. The seller shall furnish one (1) factory fabricated packaged water tube type steam boiler complete with forced draft fan and drives, natural gas and #2 fuel oil supply trains and burners, safety controls, stack gas economizer, instrumentation, and all required parts and accessories with capacity as specified herein. The boiler and all accessories as specified herein shall be new and of the best quality with the same brand or manufacturer used for each class of material or type of equipment.
- B. The packaged water tube steam boiler is defined to include, but not be limited to the following:
  - Factory assembled water steam boiler
  - Forced draft fan and motor
  - Boiler trim and accessories as specified
  - Dual fuel burners (natural gas and #2 fuel oil)
  - Flues and Breeching
  - Economizer
  - Supports and Access Platforms
  - Flue gas recirculation system (Alternate No. 1)
- C. All motors 1/2 HP and larger shall be 460 volt, three phase. All motors less than 1/2 HP shall be 120 volts, single phase.
- D. Motor horsepowers indicated in the contract documents are minimum size that will be accepted. Larger motors shall be furnished when required to prevent overloadings at any condition of operation. Motor speed for 460 volt motors shall not exceed 1800 RPM unless otherwise specified or indicated.
- E. 460 volt motors shall be premium high efficiency manufactured by Delco Division GMC, Westinghouse Electric Corp., Siemens Allis, Inc., U. S. Electrical Motors Division, General Electric, Lincoln, Reliance, or Baldor.
- F. All motor driven equipment shall be provided with direct drive unless otherwise specified herein.
- G. Direct-drive couplings shall be flexible metal type or lubricated gear type and shall be rated to handle 150% of motor horsepower nameplate data. Couplings shall be Falk, Koppers, or York.
- H. Motor Drive Guards: Guards shall also be provided for open shafting or coupling which completely enclose all rotating parts and shall be readily removable for performing maintenance work in accordance with OSHA requirements as applicable.
- I. 480 volt motor starters shall be provided for all motors provided with the equipment furnished as specified herein. Each starter, unless otherwise noted, shall be a 3-pole, across-the-line magnetic type, minimum NEMA Size "1" 480 volt, 3 phase, 60 Hertz, provided with three (3) overloads and operable on a 120 volt control circuit. Each starter shall be provided with molded case circuit breakers, and quantity of contacts shall be compatible with the system design. Breakers shall be motor circuit protector type with

adjustable instantaneous trip. Forced draft fan variable frequency drive furnished and installed by boiler installation contractor.

- J. Starters shall be as manufactured by Allen-Bradley, General Electric, Square D, Westinghouse, or ITE-Siemens.
- K. Starter overloads, one in each of separate phases, shall be sized after the nameplate data of the related motor is known.
- L. Molded Case Circuit Breakers: All 480 volt and 120 volt molded case circuit breakers shall be ambient compensated for 40 degrees C., and shall be field tested and calibrated by the manufacturer. Submit copies of test reports.
- M. Ambient Temperatures: Unless otherwise indicated, components listed hereinafter shall be designed for operation at the following ambient temperatures:
  - 1. Electric Motors: 40 degrees C.
  - 2. All Other Electrical, Instrumentation, and Control Components: 115 degrees F, or at a higher temperature where required to provide accurate and reliable function based on the component application.
- N. Furnish special tools and cabinet for tools, if required.

#### 1.02 BOILER DESIGN AND OPERATING REQUIREMENTS AND CONDITIONS:

- A. The water tube steam boiler shall conform to the following design characteristics and operating conditions:

Steam Output Maximum Continuous Rating:	60,000 lb/hr.
Design Pressure:	350 PSIG
Operating Pressure:	275 PSIG
Steam Temperature:	414 degrees F
Feedwater Temperature (to Economizer)	220 degrees F
Liquid Fuel:	#2 Fuel Oil, 142,500 BTU/gal.
Pilot Gas:	Natural gas 1000 BTU/FT <sup>3</sup>
Gas Fuel:	Natural gas 1000 BTU/FT <sup>3</sup>

- B. The efficiency of the boiler when firing the specified fuel oil at 15% excess air shall not be less than 82% without economizer and 85% with economizer. The efficiency when firing the specified natural gas at 15% excess air shall not be less than 79% without economizer and 83% with economizer. Boiler continuous blowdown rate shall be 2%.
- C. Saturated steam leaving the boiler steam drum shall not contain more than 0.5% moisture with boiler water concentrations not exceeding the values as recommended by the American Boiler Manufacturer's Association Manual of Industry Standards (ABMA).

#### 1.03 EQUIPMENT SOUND LEVELS:

- A. The seller shall submit certified sound pressure level data for the boiler forced draft fans as specified herein.
- B. All sound pressure data shall be in the near field of the fan and shall include, but not be limited to sound pressure levels re. 0.0002 microbar at 63 HZ, 125 HZ, 250 HZ, 500 HZ,

1000 HZ, 2000 HZ, 4000 HZ, and 8000 HZ as well as the equivalent dBa sound pressure level.

- C. All data on sound pressure levels shall be submitted on certified data forms from the manufacturer.

1.04 PAINTING:

- A. All prime and finish painting of equipment furnished as specified herein shall be by the manufacturer. Colors shall be manufacturer's standard unless otherwise indicated.

1.05 SUBMITTALS AND SHOP DRAWINGS:

- A. The Seller shall submit the required documents and materials in accordance with the General Requirements and as specified herein. Shop drawings, catalog cuts, bill of material, brochures, etc., shall include manufacturer's name, model number, service, type of equipment, Construction Manager's name and specific location of where installed, dimensions, capacities, and performance data on all equipment. Boiler manufacturer's proprietary fabrication drawings are not required to be submitted. Shop drawings at a minimum shall show complete dimensioned plan, front section, both side sections, and rear section of the boiler exterior and all associated components installed and ready for operation in addition to the requirements specified hereinafter.
- B. All shop drawings shall be submitted on minimum 11" x 17" sheets as specified herein.
- C. The manufacturer shall submit as a minimum, the following shop drawings and submittals for the boiler:

- Boiler (Complete)
- General arrangements
- Foundation requirements
- Customer connections
- Forced draft fan and motor
- Fan performance curves
- Electrical requirements and controls
- Boiler trim and accessories as specified
- Electrical wiring diagrams and schematics
- Bill of material
- Pneumatic diagram (if applicable)
- Instrumentation specifications for instruments furnished by Seller
- Dual fuel burners
- Gas train
- Fuel oil train
- Flues and Breeching
- Economizer
- General arrangements
- Supports and Access Platforms
- Performance data
- Boiler auxiliary electrical components
- Wiring diagrams and schematics
- Flue gas recirculation system (Alternate No. 1)

- D. The submittal data shall clearly indicate all required interconnecting wiring and pneumatic tubing connections between boiler components furnished by the Seller and boiler control

