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SPECIFICATION DIVISION 23

NUMBER SECTION DESCRIPTION

DIVISION 23
SECTION 235716 – STEAM-TO-WATER HEAT EXCHANGERS

END OF CONTENTS TABLE

DECEMBER 2014 - ADOPTED AS NEW MASTER.

11-12-19: THRUSH ADDED AS APPROVED BY HYDRONICS MTT.

1-20-2020: REVISED TO ADD GASKET REQUIREMENTS AFTER REPEATED FAILURES OF B&G "STANDARD" GASKETS. D. KARLE AS APPROVED BY THE HYDRONICS/STEAM MTT.

DIVISION 23
SECTION 235716 – STEAM-TO-WATER HEAT EXCHANGERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

INCLUDE PARAGRAPH 1.1.A AND B IN EVERY SPECIFICATION SECTION. EDIT RELATED SECTIONS 1.1.B TO MAKE IT PROJECT SPECIFIC.

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

B. Related Sections:

1. Section 019100/019110 - Commissioning
2. Section 232116 - Hydronic Piping Specialties
3. Section 232216 - Steam & Condensate Piping Specialties

1.2 SUMMARY

A. Section Includes

1. Shell and tube, steam-to-hot water, low pressure heat exchangers, components and accessories. Maximum operating steam pressure of 15 PSI.

1.3 SUBMITTALS:

A. Provide product data as follows:

1. Rated capacity, weight with and without liquid, furnished specialties and accessories.
2. Manufacturer's assembly type shop drawings indicating certified dimensions, required clearances (including tube pull clearance), pipe connection types, locations and sizes, component assembly methods, support details, and location and size of all field connections.
3. Certified computerized selections based on scheduled conditions, including leaving water temperature and flow rates and fouling factor allowances.
4. Shipping, rigging, handling, storage, installation, start-up, operation, and maintenance instructions.
5. Certification of compliance with ASME, UL, & ASHRAE fabrication requirements, specified elsewhere in these specifications.

1.4 QUALITY ASSURANCE:

A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.

B. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the following quality assurance standards; latest editions, unless noted otherwise.

1. ANSI /ASME SEC VIII Div. 1 Boiler and Pressure Vessel Code for construction and testing.

ALTHOUGH ATYPICAL, IF THE HEAT EXCHANGER MUST BE DISASSEMBLED TO BE SET IN PLACE, PROVIDE INFORMATION ON THE DRAWINGS AND OTHER CONTRACT DOCUMENTS DESCRIBING DISASSEMBLY/REASSEMBLY REQUIREMENTS.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Ship heat exchangers with weather-protected wrap for storage outdoors. Protect pipe openings and other sensitive components with heavy plastic or other durable means to ensure unit cleanliness is maintained during shipping and storage.

1.6 WARRANTY

A. Provide a complete parts and labor warranty for a minimum of 1 year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Bell & Gossett
2. Taco
3. Armstrong
4. Mueller
5. Thrush

2.2 GENERAL

A. Provide factory assembled heat exchangers consisting of shell steam and water tube construction. Include the following accessories: relief valve, air vent, and vacuum breaker, of proper size for the heat exchanger.

B. All accessories listed above shall be provided by the heat exchanger manufacturer.

C. Tag heat exchanger with mark and design capacity scheduled in the construction documents. Mark all material shipped loose to easily identify it with the corresponding heat exchanger.

D. Design, materials, manufacturing methods, and factory-testing of the heat exchanger units shall be in conformance with all applicable sections of the ASME code, and shall bear the standard ASME symbol.

E. Design working pressure and temperature shall be 125 PSIG and 375 deg. F.

F. Tube bundle shall be removable for maintenance and replacement.

G. Head material shall be cast iron or steel.

H. The heat exchanger shall be pressure tested at the factory prior to shipment.

I. All nozzle connections shall be factory sealed prior to shipment to prevent the entrance of foreign materials.

J. Flanged pipe connections shall be provided for all sizes 2-1/2" or greater. Flanged or screwed pipe connections shall be provided for all sizes 2" or smaller.

2.3 SHELL REQUIREMENTS

A. Shell material shall be steel.

B. Steam connection size shall match drawing pipe connection size.

2.4 TUBE REQUIREMENTS

A. Tube bundle shall consist of 3/4 inch copper tubes with a minimum wall thickness of 0.035”.

B. The tube sheet, tie rod, spacers, and baffle material shall be steel.

C. Water connection size shall limit nozzle velocity to no greater than 8 FPS.

D. Tube velocity shall be limited to no more than 7.5 FPS.

2.5 GASKET REQUIREMENTS

A. Tank and Head Gaskets: 304 or 316 stainless steel core material with flexible graphite facing on both faces. Minimum thickness of 1/8". Compressed fiber gaskets are not acceptable.

B. Acceptable manufacturers:

1. Teadit: Camprofile Style 942
2. Bell & Gossett: High Temperature, High Pressure “ElastaGraph”

2.6 PERFORMANCE REQUIREMENTS

A. Refer to schedules on Drawings for performance requirements.

1. Fouling Factor Allowance: water side tubes: 0.00025 $h \cdot ft^2 \cdot °F/Btu$
2. Fluid type shall be as noted in the drawing schedule and shall be factored into the performance data.

PART 3 - EXECUTION

3.1 EXAMINATION, STORAGE, AND PREPARATION

A. Upon delivery, validate integrity of the delivery protection has been maintained, the heat exchanger is undamaged, and all accessory parts were delivered. Reject damaged units. Restore protection. Provide a delivery report indicating unit condition to the Owner's Representative.

B. Rig units off delivery trucks. Comply with Manufacturer's rigging instructions.

C. Store units protected from weather, dirt, water, construction debris, and physical damage.

D. Just before installation, verify that units are undamaged. Provide a pre-installation report indicating unit condition to the Owner's Representative.

E. Examine roughing-in for equipment support, anchor-bolt sizes and locations, piping, and miscellaneous connections to verify actual locations, sizes, and other conditions affecting performance, maintenance, and operations, before equipment installation.

1. Locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and other connections.

F. Rig units into final locations. Comply with Manufacturer's rigging instructions.

MAKE THE BELOW ARTICLE PROJECT SPECIFIC, AS REQUIRED.

3.2 HEAT EXCHANGER INSTALLATION

A. Install units in strict compliance with manufacturer's installation instructions and Related Sections. Maintain manufacturer's recommended clearances for service and maintenance.

B. Install heat exchangers on support structures to achieve proper steam trap inlet leg height and to allow trap gravity drainage.

C. Install accessories shipped loose for Contractor installation, including relief valves, vacuum breakers and air vents, in accordance with manufacturer recommendations.

D. Provide offset pipe connections, or make other provisions, to allow adequate space for tube bundle removal without removal of pipe, components or accessories.

E. Insulate exchangers with insulation of same type and thickness as the connecting steam piping. Do not insulate or conceal nameplates or ASME stamps.

F. Provide isolation valves for service and maintenance of each heat exchanger.

G. Provide temperature and pressure gauges at the water side inlet and outlet of each exchanger, and as detailed.

H. The heat exchanger shall be bypassed during system clean and flush.

I. Complete the manufacturer's pre-start checklist and submit to Owner's Representative.

3.3 COMMISSIONING

A. Perform the commissioning activities as outlined in Related Section "Commissioning" and other requirements of the Contract Documents.

END OF SECTION 235716