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SPECIFICATION DIVISION 23

NUMBER SECTION DESCRIPTION

DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING (HVAC)
SECTION 232519- STEAM BOILER CHEMICAL WATER TREATMENT

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REVISIONS:
12-7-09: APPROVED AS NEW MASTER.

SPEC EDITOR: DEVELOPED BY HYDRONICS AND STEAM MECH TECH TEAM. EDIT CAREFULLY ON A PROJECT SPECIFIC BASIS.

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.

1.2 SUMMARY

A. Section Includes

1. This Section of the Specification includes the provision of all the materials, equipment and chemicals to provide complete chemical treatment systems for the steam boilers.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D859 – Test Method for Silica in Water.
2. D1066 – Practice for Sampling Steam.
3. D1067 – Test Methods for Acidity or Alkalinity in Water.
4. D1068 – Test Methods for Iron in Water.
5. D1126 – Test Method for Hardness in Water.
6. D3370 – Practices for Sampling Water from Closed Conduits.

B. Underwriters Laboratories Inc. (UL)

1. 486A - Wire Connectors and Soldering Lugs for Use With Copper Conductors.

1.4 SYSTEM DESCRIPTION

A. Provide complete chemical water treatment system.

B. Provide chemicals required for the water treatment systems in sufficient quantities for initial operation of the systems.

C. Provide controls, control wiring, motors and starters. Refer to Div. 26 for electrical requirements for motors and starters and electrical items.

D. submittals

E. Product Data: Include rated capacities; water-pressure drops; shipping, installed, and operating weights; and furnished products listed below:

1. Pumps.
2. Chemical solution tanks.
3. Agitators.
4. Control equipment and devices.
5. Test equipment.
6. Chemical feeders.

F. Shop Drawings: Detail equipment assemblies indicating dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Detail power and control wiring and differentiate between manufacturer-installed and field-installed wiring.

G. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

H. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

I. Maintenance Data: For pumps, agitators, filters, system controls, and accessories to include in maintenance manuals specified in Division 01.

1.5 QUALITY ASSURANCE

A. Field Samples

1. Procure and perform an analysis of a sample of the local water supply and base the water treatment proposal on the results therefrom.

1.6 WARRANTY

A. Provide a complete warranty for parts and labor for a minimum of one year from the date of Substantial Completion. This warranty does not include ongoing chemical treatment or monitoring..

PART 2 - PRODUCTS

2.1 STEAM BOILER CHEMICAL TREATMENT SYSTEM

A. General

1. Provide a complete chemical treatment system as detailed in the drawings with operational sequence as indicated in the drawings.

B. Treatment Chemicals

1. The chemicals for periodic regular boiler water treatment will be by owners' chemical treatment contractor, WATCON; contact Dave Russell, 419-283-4495. This contractor shall provide initial chemicals, required for flushing and boil out of the boiler and boiler feed water unit. The chemicals shall be provided by WATCON and paid for by this contractor.

C. Chemical Treatment Equipment

1. Provide one control panel as detailed in the drawings.
2. Enclosure: NEMA 1, general purpose, with all controls, switches, and lights mounted on the front.
3. Provide chemical metering pumps as detailed in the drawings.
4. Provide an external pressure relief valves constructed of type 316 stainless steel to protect the chemical pumps and discharge piping.
5. Chemical tank assembly, where indicated in the detail, shall consist of a polyethylene tank, welded steel support frame with agitator support, removable cover, suction strainer, drain fitting, and inter-connecting suction piping to chemical pumps with a tank capacity of ___ gallons.
6. For convenience of servicing and adjusting the chemical pumps, mount the pumps on a side mount platform.
7. Provide one agitator, where indicated in the details, with mounting hardware for chemical tank assembly of the direct drive type suitable for the mixing of low viscosity chemical treatment solutions. Provide agitator motor not less than 1/4 hp, 115/1/60, 1500/1750 rpm. Construct shaft and impeller of type 304 stainless steel.
8. Provide one dip tube assembly for each boiler constructed so that it may be inserted through any standard threaded 1/2-inch or larger fitting on the boiler drum, above or below the water line. Provide the insertion length to be adjustable at the time of installation so that the dip tube extends 4 to 6 inches below the normal water level in the boiler. Provide the tubing material of type 304 stainless steel and the fittings of type 316 stainless steel. Rate the tubing and fittings at not less than 150 percent working pressure of the boiler.

PART 3 - EXECUTION

3.1 PREPARATION

A. Chemical Treatment Program - Steam Boilers

1. Cleaning
   a. Immediately after the hydrostatic testing of the system has been completed, drain each boiler, flush with clean water, and refill with clean water to which the appropriate cleaning compound has been added to remove pipe joint compound, fabrication lubricants, oils, welding slag, loose mill scale, and other extraneous materials. Then boil out the boilers in accordance with the boiler manufacturer's instructions. Cool the boilers slowly and flush with clean water.
2. Chemical treatment

a. Once each boiler is clean, immediately fill it with clean water to which appropriate scale and corrosion inhibitors have been added. Then slowly bring the boilers up to boiling temperature and steam slowly with vents open for 60 minutes to deaerate the boiler water. Then close the boilers and put into service. Upon operation, dump the returning condensate to waste for the first 24 to 48 hours, or until it is free of contaminants and debris.

b. Sample boiler water at one-week intervals after boiler startup for a period of five weeks, and prepare certified test report for each required water performance characteristic. Where applicable, comply with ASTM D 3370 and the following standards:
   1) Silica: ASTM D 859.
   2) Steam System: ASTM D 1066.
   3) Acidity and Alkalinity: ASTM D 1067.
   4) Iron: ASTM D 1068.
   5) Water Hardness: ASTM D 1126.

3.2 CHEMICAL CONTAINMENT

A. Install the chemical drums on 2-drum polyethylene, 235-liter (62-gallon) capacity, 419 mm (16-1/2-inch) high pallets with top grating deck; McMaster-Carr Model 12635T13 or as approved.

3.3 WATER ANALYSIS

A. Perform an analysis of supply water periodically to determine the type and quantities of chemical treatment needed to maintain the water quality.

3.4 INSTALLATION

A. Install treatment equipment level and plumb.

B. Add cleaning chemicals as recommended by manufacturer.

3.5 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Confirm applicable electrical requirements in Division 26 Sections for connecting electrical equipment.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.6 FIELD QUALITY CONTROL

A. Coordinate with outlying boiler group technicians and WATCON representative and perform startup service under their supervision.

1. Inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before introducing chemicals for water-treatment system.

B. Test chemical feed piping as follows:

1. Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
2. Test for leaks and defects. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
3. Leave uncovered and unconcealed new, altered, extended, and replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
4. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test pressure to stand for four hours. Leaks and loss in test pressure constitute defects.
5. Repair leaks and defects with new materials and retest piping until satisfactory results are obtained.
6. Prepare test reports, including required corrective action.

3.7 ADJUSTING

A. Occupancy Adjustments: Within 12 months of Substantial Completion, perform two separate water analyses to prove that automatic chemical feed systems are maintaining water quality within performance requirements specified in this Section. Perform analyses at least 60 days apart. Submit written reports of water analysis.

END OF SECTION 232519