

SECTION 11404 - SPIRAL HEAT EXCHANGERS

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing sludge heat exchangers and all appurtenant WORK required for a complete and operable installation.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
 - 1. Section 11000 Equipment General Provisions
 - 2. Section 15250 Pipe and Equipment Insulation

1.3 CODES

- A. The WORK of this Section shall comply with the current editions of the following codes as adopted by the City of San Diego Municipal Code:
 - 1. Uniform Mechanical Code
 - 2. Uniform Plumbing Code
 - 3. Uniform Fire Code

1.4 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:
 - 1. ANSI/ASME B1.20.1 Pipe Threads, General Purpose
 - 2. ANSI B16.5 Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys
 - 3. ASME Boilers and Pressure Vessels Code

1.5 SHOP DRAWINGS AND SAMPLES

- A. The following shall be submitted in compliance with Section 01300:
 - 1. Hot water and sludge flow rates and pressure loss data.
 - 2. Shop drawings indicating general assembly, dimensions, components and connections.

1.6 OWNER'S MANUAL

- A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. Manufacturer's Data Report for Unfired Pressure Vessels, Form U-1, as required by the provisions of the ASME Code, signed by a qualified inspector, holding a National Board Commission, certifying that construction conforms to the latest ASME Code for unfired pressure vessels at a working pressure of [50] psig.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. Spiral heat exchangers shall be designed for [digester makeup heating of municipal wastewater sludge]. The sludge to be heated will be [a mixture of primary and secondary sludge].

2.2 DESIGN REQUIREMENTS

- A. Operating requirements for heat exchangers shall be as follows:

1. Identification No. - []
2. Heat transfer capacity, BTU/hr - []
3. Hot water flow rate, gpm - []
4. Sludge flow rate, gpm - []
5. Sludge concentration, percent solids
 - Minimum - []
 - Average - []
 - Maximum - []
6. Entering hot water temperature, degrees F - []
7. Exiting hot water temperature, degrees F - []
8. Entering sludge temperature, degrees F - []
9. Exiting sludge temperature, degrees F - []
10. Pressure loss, feet, maximum
 - Hot water - []
 - Sludge - []

- B. **Construction:** The spiral heat exchangers shall be welded steel fabrication consisting of two strips of steel plate wrapped into continuous concentric horizontal spiral passages. Heat

exchangers shall be designed with no sharp bends or obstructions in the internal passages and shall provide full counter-flow heat transfer.

The heat exchangers shall have 125 pound ANSI flanged connections for both sludge and water and shall bear an ASME inspector's stamp complete with design working pressure and date and place of manufacture.

Each spiral heat exchanger shall have a hand cleanout port located near the sludge inlet, and one entire side of each heat exchanger body shall be hinged and fastened by special hook bolts to provide easy access to the sludge spiral for inspection and cleaning. All sludge passageways shall be designed to pass 3-inch spheres. The far side of the hot water spiral shall be provided with 1/4-inch drain cocks. A 3/4-inch drain cock shall be provided on the low point of the sludge spiral. Pipe connections shall be [6]-inch flanged.

C. Accessories:

1. Three-Way Valve: Each spiral heat exchanger shall be supplied with a three-way thermostatic control valve designed to modulate hot water flow through the heat exchanger, as required to maintain the pre-selected sludge discharge temperature from the exchanger. The valve shall be designed for a maximum flow rate of [] gpm with an allowable head loss of [] psig and a CV of [] at fully open position. Each valve shall have an adjustable set point between 90 and 120 degrees F. The valve shall be [] inches in diameter, with a flanged cast iron body and stainless steel trim. The valve shall be designed to bypass all hot water flow if the water temperature exceeds [] degrees F.
2. Thermal wells shall be provided on both the sludge inlet piping and sludge outlet piping to the sludge heat exchanger for the thermostatic valve control bulb. Capillary tubing of sufficient length to reach either thermal well, shall be provided so that the thermostatic valve can be controlled by either sludge inlet temperature or sludge outlet temperature.
3. Bypass Valve: Each exchanger shall be provided with a []-inch bypass ball valve to equalize the hot water flow between the exchanger and the bypass line.

2.3 MANUFACTURERS

A. Products shall be manufactured by one of the following (or equal):

1. Heat exchangers:

ALFA LAVAL Thermal Company
Graham Manufacturing Co., Inc.

2. Control valves:

Fisher Controls
Leslie Company
Robertshaw Controls Company

PART 3 -- EXECUTION

3.1 GENERAL

- A. Each heat exchanger with piping and accessories shall be aligned, connected and installed at the location indicated and in strict conformance with the manufacturer's written instructions, with due allowance for thermal expansions, supports, anchors, and drainage. All hot surfaces on equipment and piping shall be insulated in accordance with Section 15250.

3.2 TESTING

- A. After the completion of installation, each heat exchanger shall be completely field tested to ensure compliance with the performance requirements as indicated.

** END OF SECTION **