SECTION 11403 - SHELL AND TUBE 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 shell-and-tube heat exchangers designed for heating sludge.

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 11201 Hot Water Circulating Pumps
3. Section 15250 Pipe and Equipment Insulation

1.3 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ANSI/ASME Boilers and Pressure Vessels Code

1.4 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Manufacturer's product data including catalogue cuts for manufactured products and assemblies.

2. Shop drawings showing details, dimensions, locations and size of tappings.

3. Manufacturer's certification that heat exchangers comply with the indicated requirements.

4. Test reports of tube bundle performance tests.

1.5 OWNER'S MANUAL

A. In addition to the requirements of Section 11000, the following shall be submitted in compliance with Section 01300:

1. Operation and maintenance data including start up and shut down instructions, assembly drawings, and spare parts lists.

1.6 REGULATORY REQUIREMENTS

A. The WORK of this Section shall comply with Section 8D of the ANSI/ASME Boilers and Pressure Vessels Code for manufacture of tubular heat exchangers and heat exchanger shells.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. In addition to the requirements of Section 11000, heat exchanger internals shall be protected from entry of foreign material by temporary caps on flanged openings.

PART 2 -- PRODUCTS

2.1 GENERAL

A. **General:** Only heat exchangers certified as complying with the indicated requirements shall be provided.

B. **Products:** Heat exchangers shall be new, of current manufacture, and shall be the products of reputable manufacturers specializing in the manufacture of such products.

C. **Performance:** Heat exchangers shall be designed and constructed for heating of sewage sludge using hot water as the heat source.

2.2 SHELL AND TUBE HEAT EXCHANGERS

A. **General:** Shell and tube heat exchangers shall be of the U-tube type designed for hot water as the heat source.

B. **Performance:** Shell and tube heat exchangers shall comply with the following:

Schedule	
Drawing Reference	[ ]
Identification Number	[ ]
Location	[ ]
Diameter or Width [ft] [in]	[ ]
Length [ft] [in]	[ ]
Heating Media	[ ]
Number of Passes	[ ]
Flow Rate, gpm	[ ]
Entering Pressure, feet of water	[ ]
Fouling Factor	[ ]
Working Pressure, feet of water	[ ]
Heated Media	[ ]
Pressure Drop, feet of water	[ ]
Entering Temperature, EF	[ ]
Leaving Temperature, EF	[ ]

C. **Construction:** Construction of shell and tube heat exchangers shall comply with the following:

1. Tubes: U-tube type with 3/4 inch OD minimum seamless [copper] [stainless steel] [cupro-nickel] [naval brass] [steel] tubes suitable for [125] [ ] psig.

2. Shell: [steel] [stainless steel] pipe with threaded or flanged piping connections and necessary tappings, steel saddle and attaching U-bolts, prime coated.

3. Heads: [cast iron or fabricated steel] [cast brass] [fabricated stainless steel] with [steel or bronze] [rolled naval brass] [stainless steel] [glass filled polypropylene] tube sheets, threaded or flanged for piping connections.

4. Water Chamber and Tube Bundle: removable for inspection and cleaning.

D. **Accessories:** Shell and tube heat exchangers shall include temperature indicators, isolating valves, drains and the following:

1. Water Inlets and Outlets: Thermometer wells and thermometers, pressure gage tappings and gages.

2. Heated Water Outlet: Temperature regulator sensor; ASME rated pressure and temperature relief valve; valves shall be drained.

3. Three-way Control Valves: Valves shall be installed where indicated to control the hot water flow to the hot water heat exchanger and maintain the hot water at an adjustable preset temperature; control valves shall include pneumatic temperature controller with stainless steel thermal-well, pneumatic positioner, instrument air pressure reducing valve and air filter; instrument air shall be supplied at [100] [ ] psig.

2.3 SPARE PARTS AND NAMEPLATES

A. **Spare Parts:** Heat exchangers shall include [2] [ ] sets of replacement gaskets.

B. **Nameplates:** Heat exchangers shall include nameplates of stainless steel engraved or stamped and fastened to the equipment in accessible locations. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the heat exchanger performance ratings.

2.4 SHELL AND TUBE HEAT EXCHANGER MANUFACTURERS

A. Shell and tube heat exchangers shall be manufactured by one of the following (or equal):

American-Standard Heat Transfer Division
Patterson-Kelley Co.
Young Radiator Company

PART 3 -- EXECUTION

3.1 INSTALLATION

A. **General:** Heat exchangers shall be installed in accordance with the manufacturer's installation instructions with proper allowances for thermal expansion, supports, anchors and the following:

1. Installed to permit removal of [tube bundle] [parts] with minimum disturbance to installed equipment and piping.

2. Supported on welded steel pipe and angle floor stand.

3. With shell pitched to drain condensate.

4. With relief valves piped to nearest floor drain.

5. With drain valves piped to nearest floor drain.

B. Hot surfaces shall be insulated.

** END OF SECTION **