

**SECTION 23 25 00**  
**SIDE-STREAM SOLID SEPARATION SYSTEM**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies treatment of circulating HVAC water systems, including the following:  
Side-stream Solid Separation system.

**1.2 RELATED WORK**

- A. Test requirements and instructions on use of equipment/system: Section 01 00 00, GENERAL REQUIREMENTS.
- B. General mechanical requirements and items, which are common to more than one section of Division 23: Section 23 05 11, COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.
- C. Piping and valves: Section 23 21 13, HYDRONIC PIPING

**1.3 QUALITY ASSURANCE**

- A. Refer to paragraph, QUALITY ASSURANCE in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Manufacturer's Literature and Data.
- D. Maintenance and operating instructions in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

**1.5 APPLICABLE PUBLICATIONS**

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. National Fire Protection Association (NFPA):  
70-2008.....National Electric Code (NEC)
- C. American Society for Testing and Materials (ASTM):  
F441/F441M-02 (2008) ... Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

**PART 2 - PRODUCTS**

**2.1 WATER TREATMENT FOR CLOSED LOOP SYSTEMS**

- A. Side stream Solid Separation System for Closed Loop Systems with pump, completely factory assembled. Primary Purpose is to remove unwanted

solids from the chilled water system or cooling tower water by utilizing a hydrocyclone separator. A fully assembled separator package system shall be supplied to prevent the accumulation of troublesome solids in the systems. The flow of water through the separator package shall be continuous and without interruption during the periodic purging of separated solids.

## **2.2 SEPARATOR PERFORMANCE REQUIREMENTS**

Testing Requirements - Each unit must be tested by the manufacturer prior to shipment to ensure it conforms to stated operating specifications.

- A. Independent Testing Laboratory - Performance of the separator must be verified by published results from an independent third party testing laboratory. Standard test protocol of upstream injection, downstream capture, and separator purge recovery is allowed with 50-200 mesh particles to enable effective, repeatable results. Single pass test performance must not be less than 95% removal. Model tested must be of same flow-design as specified unit.
- B. All Systems - In a single pass through the separator, given solids with a specific gravity of 2.6 and water at 1.0, performance is expected to be 98% of 74 microns and larger. Additionally, particles as fine as 5 microns, heavier by specific gravity and some lighter by specific gravity will also be removed.
- C. In Recirculating Systems - 98% performance is predictable to as fine as 40 microns (given solids with a specific gravity of heavier than the carrying fluid). Additionally, particles as fine as 5 microns, heavier by specific gravity and some lighter by specific gravity will also be removed.

## **2.3 CONSTRUCTION**

- A. Package - A complete factory assembled pump package with: PF-61 series separator, pump and motor, pre-strainer, skid, interconnecting face piping, control panel, and recovery system.

- B. Separator - The hydrocyclone separator shall incorporate a true tangential inlet and dumbbell body design. As the pressurized process carrying fluid enters tangentially into the entrance chamber of the separator, it starts a downward helical flow. This downward spiral motion, in conjunction with the reduced body diameter, causes high centrifugal forces to act on the carrying fluid. The solids in suspension are forced to the wall of the separator body, and then downward into the accumulation chamber at the bottom of the separator. The clean process fluid (inner vortex) then reverses its axial direction and moves upward in a helical flow exiting via the separator outlet.
- C. Purging is necessary to eliminate the high concentration of solids build-up in the separator's accumulation chamber and can be performed while the separator remains on-line. The purge is set at a constant flow to the recovery system. The purged waste is concentrated in the recovery system while the clean fluid is drawn back into the system flow. The level of solids contamination in the system will dictate the frequency of recovery system bag changing and/or cleaning.
- a. The separator's design shall not require additional devices, such as external pressure lines or accelerating slots, to ensure maximum particle removal at any flow.
  - b. The separator's design shall allow for passage of (at a minimum) 1/2" diameter particles to the accumulation chamber without the need for physical access to the separator interior.
  - c. The separator's design shall allow for self ventilation of air. Manual air vent shall be included for timely start-up.
  - d. All separators with inlet/outlet connections 4" and larger shall feature a hand-hole at the collection chamber access for either inspection or the removal of unusual debris.
  - e. To prevent the buildup of unnecessary particulate within the separator, purge location shall be at the lowest point of the separator accumulation chamber.
- D. Pump & Motor - Cast iron bronze fitted, close coupled end-suction (flooded suction required). Pre-strainer: flanged cast-iron

housing; 9/32-inch minimum perforated stainless steel basket, and flange removable lid.

E. Connections:

150-lb flange inlet and 150-lb flange outlet.

F. Solids Collection Vessel - Constructed of 304-stainless steel and

includes: stainless steel basket, manual air pressure relief valve, flow control orifice and two 25- micron fiber-felt solids collection bags.

- a. Design conditions: Solids capacity 360 cubic inches (6 liters).
- b. Indicator package - Recovery vessel shall be equipped with pressure differential gauge to identify when the internal bag requires cleaning/replacement.

G. Electrical Control - NEMA type 4X polycarbonate enclosure with door disconnect switch, motor start/stop and short-circuit/overload protection, 120V step-down transformer, pump and purge Hand-Off-Auto (H-O-A) switches, and purge timer.

- a. Power requirement: 208/230/460V, 3-phase, 60 Hz.
- b. Consult factory for voltages not listed.

H. Structural Skid - Structural steel framework shall be constructed of carbon steel for maximum rigidity. (Channel or plate skids are not acceptable.)

I. Coating - UV resistant fusion bonded polyester coated separator body and skid. (Enamel based paint is not acceptable.)

J. Included Options:

- a. NEMA premium efficiency TEFC motor
- b. Inlet / outlet isolation valves
- c. Schedule 40 carbon steel interconnecting face piping with Schedule 80 PVC to solids recovery vessel
- d. UL listed control panel
- e. Recovery vessel dry contact - The indicator gauge may be supplemented with a dry contact in order to provide remote signal

and/or local indicating light (120V) when bag servicing is required.

E. Solids Collection Vessel (as specified in the schedule) - Constructed of 304-stainless steel and includes: stainless steel basket, manual air pressure relief valve, flow control orifice and two 25- micron fiber-felt solids collection bags.

- a. Design conditions: Solids capacity 360 cubic inches (6 liters).
- b. Indicator package - Recovery vessel shall be equipped with pressure differential gauge to identify when the internal bag requires cleaning/replacement.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install equipment furnished by the supplier according to the manufacturer's instructions and as directed by the Contracting Officer's Representative (COR).
- C. Instruct VA personnel in system maintenance and operation in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

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