**HYDROCYCLONE SEPARATOR**

**SECTION \_\_\_\_\_**

# PART I – GENERAL

* 1. **Summary**

Furnish and install the hydrocyclone separator as specified herein.

**Primary Purpose:** To remove unwanted solids from the cooling tower water by utilizing a hydrocyclone separator. The flow of water through the separator package shall be continuous and without interruption during the periodic and/or continuous purging of separated solids.

The hydrocyclone separator shall be designed to: reduce particle fouling of the cooling system's components, reduce maintenance and servicing, maintain efficiency of the heat exchange process, limit blow down and chemical use, and help control harmful biological growth in the basin/sump.

**1.02 Separator Performance Requirements**

1. 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.
2. 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.
3. 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.

**PART II – EQUIPMENT**

* 1. **Design Criteria**

1. Identification – Hydrocyclone separator is a model PF-61-\_\_\_\_\_\_\_\_\_\_ and is manufactured, assembled, and tested by Puroflux Corporation.
   1. Flow rate shall be \_\_\_\_\_\_\_\_ (U.S. GPM / m3/hr).
   2. Pressure loss shall be between 3-12 psi (.2 to .8 bar) remaining constant and only varying when the flow rate changes.
   3. Maximum working pressure: 150 psi (10.3 bar).
   4. Maximum operating temperature: 150°F (65.5º C).
   5. **Construction**
2. **Separator** - The Puroflux PF-61 hydrocyclone separator; incorporating a true tangential inlet and dumbbell body design, utilizes the centrifugal forces created in the body of the separator as the basis for effective separation of solids. 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 pushed to the wall of the separator in a manner which does not promote wear of the separator body, and then downward to 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.

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 level of contaminants in the process system will dictate the purge frequency.

Hydrocyclone separator may be used in conjunction with automatic purge and/or recovery vessel to aid in the elimination of collected particulates

* 1. 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.
  2. 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.
  3. The separator’s design shall allow for self ventilation of air. Manual air vent shall be included for timely start-up.
  4. 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.
  5. To prevent the buildup of unnecessary particulate within the separator, purge location shall be at the lowest point of the separator accumulation chamber.

1. **Manual purge** - Industrial grade two-way brass ball valve with manual handle.
   1. Optional automatic purge (available upon request)
2. **Connections** 
   1. (2-1/2” separators and smaller)­\_\_\_" mpt inlet and outlet
   2. (3” separators and larger) \_\_\_" 150-lb flange inlet and outlet
3. **Coating** - UV resistant fusion bonded polyester coated. (Enamel based paint is not acceptable.)
4. **Mounting** 
   1. Legs standard for separators 4” and larger.
   2. Optional mounting brackets or legs for separators 3” and smaller (available upon request).

1. **Options** - Available upon request
   1. Inlet / outlet isolation valve kit
   2. Automatic purge - Industrial grade two-way brass purge valve with direct mount 100-240VAC electric actuator and field adjustable purge timer. Factory purge settings: 30-seconds every 6-hours.
      1. Electrical Control - NEMA type 4X polycarbonate enclosure with purge Hand-Off- Auto (H-O-A) switch, and purge timer.
      2. Power requirement: 120V/1ph/60Hz.
   3. Recovery vessel – (Shipped loose for field installation by others) Shall be constructed of 304 stainless steel with stainless steel basket, manual air pressure relief valve, and two 25-micron fiber felt solids collection bags. Also includes pressure differential gauge to identify when internal bag requires cleaning and/or replacement.
      1. Optional dirty bag alarm – the indicator gauge may be supplemented with a dry contact in order to provide remote signal and/or local indicating light when bag servicing is required.
      2. Power requirement for local indicating light operation: 120V/1ph/60Hz
   4. **Manufacturer**

The hydrocyclone separator shall be manufactured by Puroflux Corporation in Simi Valley, California, USA. Specific model number PF-61- \_\_\_\_\_\_\_\_\_\_\_

# PART III – EXECUTION

**3.01 Installation**

1. Coordinate with the installing contractor to ensure equipment is installed in conformance with manufacturer’s recommendations and those found in the specification.