HydroThrift Engineering Specifications

( ) Denotes optional features – Edit in accordance with your project requirements.

1.0 Closed Loop {Air Cooled} Dry-Type Cooling System

1.1 General: Dry-type closed loop cooling system shall consist of an air-cooled heat exchanger, **(**trim cooler**)**, and a pump and control unit supplied by HydroThrift Corporation. The cooling system shall be guaranteed to cool _____ GPM of _____ % (Ethylene Glycol/Water)(Propylene Glycol/Water) from _____°F to _____°F at _____ °F entering design dry bulb temperature. The closed loop recirculating pump shall re-circulate the flow and produce a total head of _____ ft.

1.2 Heat Exchanger

1.2.1 General: The heat exchanger shall be constructed of seamless copper tubing with mechanically bonded aluminum fins and shall also have a suspended coil design. The coil shall be pressure tested under water with 400 psig air. The cabinet shall be constructed of aluminum or galvanized steel, which is bolted, riveted, and reinforced by heavy gauge die-formed members. The heat exchanger shall include direct drive fan(s), Weather Protected (WP) fan motor(s) with automatic thermal overload protection set to trip at _____°F, copper headers with Outside Diameter Sweat (ODS) connections, and drain and vent valves for easy purging and draining. Fan motor(s) shall be wired to a distribution block mounted in a NEMA 3R panel located on the air-cooled heat exchanger. Fan cycling capacity control shall be located in the control panel on the pump skid. Fan sections shall be partitioned to prevent air bypass for greater efficiency. Quiet multi-bladed propeller fan(s) shall provide uniform air distribution throughout the coil surface. Standard 22” support legs shall be shipped loose with the heat exchanger for field mounting.

1.2.2 (Flanged Connections): Flanged connections shall be provided on the copper headers for simple connection to the heat exchanger.

1.2.3 (Trim Cooler): The trim cooler shall either be a plate & frame or shell & tube heat exchanger fully mounted and piped onto the pump skid. The trim cooler shall be designed to cool the liquid, with a cooling water temperature at _____ °F, when the max ambient temperature at _____ °F exceeds the design dry bulb temperature.

1.3 Pump & Control Unit

1.3.1 General: The pump and control unit shall consist of a combination vent and surge tank; close-coupled centrifugal circulating pump; **(**trim cooler**)**; **(**full capacity standby pump**)**; **(**service valves**)**; **(**temperature control valve**)**; and an electrical control panel, all mounted on a structural steel frame with a solid steel deck. All carbon steel piping; one temperature gauge on the supply side of equipment, one temperature gauge on the return side of the equipment, and each shall be provided with a thermo well; one pump suction pressure gauge, one pump discharge pressure gauge, and each shall be provided with a gauge cock; isolation valves for the pump(s); and wiring shall be included within the confines of the pump skid.

1.3.2 Tank: The vent and surge tank shall be designed with sufficient volume to accommodate the closed loop fluid thermal expansion, shall separate air and liquid, and cushion the surge of water when starting and stopping the system. The tank shall include a gauge

glass, manual vent valve, fill connection, and drain valve. The tank shall be designed and constructed of carbon-steel in accordance with the current revision of ASME Section VIII, Division 1 Pressure Vessel Code with a design pressure of 125 psig and a design temperature of 650 °F.

1.3.3 **Pump:** The circulating pump shall be a close-coupled centrifugal circulating pump with the impeller, motor speed, and motor power selected such that the pump does not overload the motor anywhere along the pump manufacturer's printed pump curve. The pump motor shall be TEFC. The pump shall be piped and installed such that it can be isolated and removed. The piping shall not induce any stress on the pump.

1.3.4 **Piping:** All piping shall be carbon steel with the design and fabrication in compliance with ANSI and ASME specifications. Piping construction shall be threaded for 0.50"–2.5" nominal pipe size and welded for 3" and larger. All welding shall be performed using procedures and personnel certified in accordance with ASME Section IX. All piping that is smaller than 1.25" NPS shall be Schedule 80 ASME SA106 Grade B, piping 1.25" to 2" NPS shall be Schedule 40 ASME SA106 Grade B, and all piping 2.5" NPS and larger shall be Schedule 40 ASME SA53 Grade B. Class 150 threaded fittings shall meet ASME SA197 and ASME B16.3. Standard welded fittings shall meet ASME SA234 WPB and ASME B16.9. Forged steel Class 3000 unions shall be used for piping connections 2" and smaller. ANSI 150 lb flanges shall be used for piping connections of 2.5" and larger and shall meet ASME SA105 and ASME B16.5 requirements.

1.3.5 **(Service Valves):** The service valves shall be installed on the supply and return connections to the customers' equipment to isolate the customers' equipment from the pump and control unit. Ball valves shall be used up to 2" and butterfly valves shall be used for sizes 2.5" and larger.

1.3.6 **(Full Capacity Standby Pump):** The pump and control skid shall have a full capacity standby–circulating pump mounted, piped, and wired. Check valves shall be provided to prevent back flow when either pump is running. An automatic pump alternator shall be provided to switch operating pumps every time the selector switch is operated or in the event the operating pump motor overload trips.

1.3.7 **Electrical Control Circuit:** The NEMA (12)(7)(4)(4X) electrical enclosure shall include IEC-rated integrated motor starter protectors with a circuit breaker, contactor, and overload protection for the circulating pump and fan(s). A single point 460/3/60 electrical power connection with power distribution block and branch circuits to each motor starter shall be provided. The control circuit shall include a 115/1/60 control voltage transformer, power on light, off-on selector switch for the circulating pump(s), thermostatic fan cycling controls, and on-off-auto selector switch for the fan(s). The electrical panel shall only utilize UL listed or UL recognized electrical components and shall be designed and fabricated in accordance with the latest revision of UL 508 as certified by ETL or another independent inspection agency.

1.3.7.1 **(Indicating Lights):** White enclosure door lights shall be provided to indicate all energized motors.

1.3.7.2 **(Alarm Horn/Silence Pushbutton):** An audible alarm horn shall be mounted to the electrical enclosure. The horn shall have a volume adjustment and shall be the same NEMA rating as the electrical enclosure. A silence push button shall be mounted on the enclosure door. The horn shall provide audible indications if any of the following alarm conditions occur.

1.3.7.3 **(Low Liquid Level Alarm):** A solid-state conductance type liquid level control shall be provided and mounted on top of the vent and surge tank. The control shall consist of an electrode fitting with a pressure rating of 125 psig, two electrode rods, and a 6-second

time delay liquid level relay. In the event of a low liquid level condition, an optional red alarm indicating light shall be illuminated and the optional alarm horn (if supplied) shall sound.

1.3.7.4 (Low Flow Alarm): A paddle type flow switch shall be utilized in the event of a low flow condition. The flow switch shall have a pressure rating of 150 psig. In the event of a low flow condition, an optional red alarm indicating light shall be illuminated and the optional alarm horn (if supplied) shall sound.

1.3.7.5 (High Temperature Alarm): Thermostatic controls shall be provided to indicate operating fluid temperature higher than the design temperature. The temperature switch shall alarm at _____°F above the design operating temperature. In the event of a high temperature alarm condition, an optional red alarm indicating light shall be illuminated and the optional alarm horn (if supplied) shall sound.

1.3.7.6 (Motor Overload): Indication of pump motor failure due to an overload condition shall be supplied for all pump motors. If the overload relay on the motor starter trips, a panel-mounted light shall illuminate and the optional alarm horn (if supplied) shall sound.

1.3.7.7 (Main Panel Disconnect Switch): The optional main panel mounted disconnect switch shall be a (fused)(non-fused)(circuit breaker switch)(circuit breaker interrupting switch). It shall have a manually operated handle, which shall interrupt power to the entire cooling system and shall have means to lock-out/Tag-out.

1.3.7.8 (Motor Disconnect Switch): All motors or bank of motors shall be provided with an optional NEMA 4 disconnect switch that is in compliance with the NEC code.

1.4 Warranty

1.4.1 Pump & Control Unit: The manufacturer's standard warranty shall be for a period of one year from the date of startup or eighteen months from the date of shipment.

1.4.2 Heat Exchanger: The heat exchanger coil shall be warranted to be free from defects in material and workmanship under normal use and service for a period of three years after delivery to original user, but in no case more than 42 months from date of manufacture. All other components shall be warranted for a period of 1 year from start up or 18 months from shipment, whichever occurs first.