

## SPECIFICATION FOR PORTABLE ACTIVATION TANK

**1. SCOPE:** This specification covers the performance, design, and construction requirements for a portable activation tank to be used for activating sonobuoys in saltwater solutions ranging in temperature from +32°F to +131°F.

**2. PERFORMANCE:** The activation tank shall be capable of controlling the temperature of a saltwater solution in the workspace throughout the range specified below.

**2.1 Temperature Range:** +30°F to +140°F

**2.2 Temperature Control Tolerance:** To control the temperature of the heat transfer solution within  $\pm 1^\circ\text{F}$  of set point, after stabilization at any selected temperature throughout the entire operating range.

**2.3 Temperature Change Rates:**

**2.3.1 Pulldown:** +140°F to 30°F within 300 minutes.

**2.3.2 Heatup:** +30°F to +140°F within 300 minutes.

**3. DESIGN AND CONSTRUCTION:** The activation tank shall be designed and constructed for optimum performance during intermittent or continuous operation. All component designs are to include proven criteria to assure feasibility and reliability prior to inclusion into the system design. The equipment as furnished shall be so designed as to require a minimum of maintenance. All features necessary to permit safe and reliable operation of the equipment by the operators shall be included whether specifically mentioned or not. Material, parts, electrical and mechanical assemblies, and workmanship shall be in accordance with the highest commercial and engineering standards of the industry and shall be of a quality consistent with intended use and specified performance requirement. The tank shall be engineered and installed as a complete package, ready for operation upon connection of electrical power.

The following requirements shall apply:

**3.1 Dimensions:**

3.3.1 The test area dimensions shall be (from top to bottom)  $28 \pm 1$  inches in diameter for the first 12 inches in depth. Then the diameter shall reduce in size to 17 inches for the remaining 28 inches in depth. Making the total depth of the tank 40 inches. The area shall be clear of all coils, circulators, and other protrusions.

3.1.2 The maximum exterior dimensions of the entire activation tank, including bath compartment and machinery compartment, shall be no greater than 66 inches wide by 60 inches high by 45 inches front to rear.

**3.2 Layout:** The activation tank shall be divided into two compartments a bath compartment and a machinery compartment.

3.2.1 The cylindrical work space shall be constructed of heli-arc-welded stainless Steel to be compatible with sea water and acids.

3.2.2 The work space shall be encased in a cylindrical double walled housing. The housing shall be constructed with a minimum of heli-arc welded stainless steel and shall be concentric with the workspace. The area between the double walls shall be used for circulation of the temperature conditioned heat-transfer medium.

3.2.3 A fluid pump shall be provided for circulation of the temperature conditioned heat transfer medium. This medium shall not be water and shall be a low volatile fluid containing corrosion inhibitors. The fluid shall be compatible with the operating range. The heat transfer medium shall not mix with the salt water in the workspace.

3.2.4 The fluid pump shall discharge to a temperature conditioning reservoir. The reservoir shall contain the heating and cooling system and the temperature sensing element.

3.2.5 The fluid shall discharge from the reservoir through the inner housing and return to the reservoir.

3.2.6 The route of circulation for the heat transfer medium shall be such that, after stabilization at any temperature in the operating range, all locations of the inner housing shall be at constant temperature within  $\pm 1^\circ\text{F}$ .

3.2.7 One inch (1") Stainless steel drains with one (1") stainless steel valves shall be provided for draining and cleaning of the inner housing, outer housing, manifold, and workspace.

3.2.8 The housing, pump, and reservoir shall be surrounded by mass type fiberglass insulation for low heat transfer.

3.2.9 The reservoir and all interconnecting piping shall be constructed of stainless steel.

3.2.10 The exterior of the bath compartment shall be constructed of rolled steel finished with a **Textured Gray or Blue corrosive resistant** paint.

3.2.11 The entire activation tank shall be mounted on 6" hard surfaced wheels. The two front wheels shall swivel, and the two rear wheels shall be rigid locking type casters to provide portability.

**4. REFRIGERATION SYSTEM:** Cooling of the workspace shall be accomplished by conductive heat transfer. The heat transfer medium shall be cooled by a single state 1 HP mechanical refrigeration system. No thermostatic type expansion valves shall be used in the refrigerant circuit.

**4.1 Compressor:** The refrigerant compressor shall be of the hermetically sealed type, with motor and compressor encased in a hermetically sealed housing. The compressor shall be of the suction-cooled type, and shall be mounted in the machinery compartment of the test chamber with spring mounting for quiet, vibration-free operation.

**4.2 Refrigerant Connections:** Vibration eliminators and/or expansion loops shall be installed in all refrigerant piping where necessary to reduce vibration to a minimum.

**4.3 Cooling Coils:** The coils shall be properly circuited to reduce pressure drop and maintain proper internal tube velocity for maximum efficiency.

**4.4. Condenser:** The refrigerant condenser shall be of the air-cooled type.

**4.5 Solenoid Valves:** All refrigeration solenoid valves shall be Asco, or equal, of the forged body type with "come-apart" construction. The enclosing tube shall be of stainless steel and the interior working parts shall be of corrosion resistant materials. The body and the enclosing tube shall be joined by a union nut with gasket. Solenoid valve coils shall be Class "B", completely encapsulated, suitable for a total temperature of  $+260^\circ\text{F}$ , and suitable for high moisture and humidity conditions.

**4.6 Pressure Cutouts:** The refrigeration circuits shall be equipped with a Penn, or equal, high pressure cutout switch to protect the refrigeration equipment from excessive pressure.

**4.7 Refrigerant Accessories:** The refrigerant accessories shall consist of the necessary liquid line solenoid valves, suction line heat exchanger, liquid sight glass, drier, oil separator, and the necessary inter-connecting copper tubing and fittings. All refrigerant connections shall be sil-fos or silver soldered.

**4.8 Motor Protection:** The compressor shall be supplied with internal motor protection.

**5. HEATING SYSTEM:** The activation tank shall be heated by circulating the transfer medium over monel sheath heaters located in the reservoir. These heaters shall have the capacity to raise and maintain the temperature of the medium such that the salt water in the workspace can be controlled at any temperature in the operating range.

**6. FLUID PUMP:** The pump and motor shall be of the monobloc design. The pump shall have a minimum capacity of 20 gpm.

**7. INSTRUMENTATION:** The activation tank shall be controlled by a solid state indicating controller with proportioning control. Equal to a Honeywell Model UDC2000 Mini-Pro Universal Digital controller.

7.1 The controller shall a digital display with simple English prompts.

7.2 The temperature range of the instrument shall be 0°F to +175°F.

7.3 The controller used must have a temperature set point capable of setting a high (+95°F) and a low (+32°F) temperature.

7.4 The controller shall have the capability to be configured in °F/°C with High Noise Immunity.

**8. CONTROLS:** Individual switches shall be provided for powering heaters, refrigeration, and workspace (salt water) circulation pump. All controls including the temperature controller indicator and switches for heating, cooling, and circulation pump shall be panel mounted at the front of the activation tank. Pilot lights for each individual function shall be provided; those for the refrigeration and heating shall cycle with instrument demand. All items on the control panel shall be specifically identified with laminated engraved name plates.

**9. POWER REQUIREMENTS:** Three complete sets of electrical schematics and full load power requirements shall be provided.

9.1 The activation tank shall be furnished with one 10 foot long (minimum) power cord with three wire grounded plug for 230 VAC, single phase, 60 cycle to supply all required electrical power.

9.2 All electrical wiring and components shall conform to the National Electrical Code.

**10. CIRCULATION SYSTEM:** The saltwater tank shall have a circulation pump that will continuously circulate the salt water from the bottom of the tank and return it back into the top of the tank at a rate of 7-10 gallons per minute. The parts, and materials used shall be of a non corrosive material to salt water.

## **11. MISCELLANEOUS:**

**11.1 Handbooks or Manuals:** With shipment of the chamber, the contractor shall furnish two copies of handbooks or manuals covering complete installation, disassembly, operating and maintenance instructions. A complete parts list must be included in each of the manuals.

**11.2 Contractor Inspection and Testing:** The activation tank shall be tested and checked for proper operation and conformance to purchase specifications prior to shipment. Notification shall be given to the Contracting Officer, NSWC Crane Div. two weeks prior to making operational tests so that arrangements may can be made, for representatives of NSWC Crane Division to be in attendance if such observation is desired. All checkout data shall be shipped with tank to NSWC Crane Div.

**11.3 Initial Design Drawings:** Layout drawings, illustrating compliance with the specifications herein, of the equipment showing penetration locations, instrumentation location, machinery locations, bath compartment layout, etc., shall be provided for review by NSW Crane Div. personnel prior to beginning fabrication, within 15 days from effective date of Contract. The time of submission and review of drawings shall be included in the delivery schedule. NSW Crane Div. shall review the drawings in less than 7 working days from receipt.