

DU BPS3000 BRINE PRODUCTION SYSTEM FEATURING ULTRA-EASY CLEANOUT SPECIFICATION

February 2002

It is the intent of this Specification to describe in detail an Ultra Easy-Clean Out Brine Production System. This system shall be designed and constructed to convert rock salt to finished salt brine. It shall also include a self-contained hydraulic system to rotate the lower brine holding tank and trash screen down when cleaning is desired, allowing all debris in the salt hopper to simply flow into a standard 2 or 3 cu. yd. loader bucket. Total clean-out will only take approximately 10-15 minutes and requires no personnel entry into the system for shoveling.

I. General:

- A. The BPS3000 Brine Production System shall be capable of producing approximately 3,000 Gallons of Brine Per Hour (based on owner's water supply of 50 GPM or more).
- B. System shall be designed and constructed to be easily filled with rock salt using a standard 2 cu. yd. or 3 cu. yd. loader bucket (no conveyors or augers required).
- C. System shall be designed and constructed to be easily cleaned of all debris in the salt hopper with a standard 2 cu. yd. or 3 cu. yd. loader bucket. To do this, the loader operator will simply position his loader bucket below the system's lower brine holding tank. He will then switch on the self-contained hydraulic control system. The operator will then rotate the system's pivoting trash screen and lower brine holding tank down, allowing all debris in the salt hopper to flow into the loader bucket.
- D. System shall also be designed and constructed to provide for easy clean out of the silt and other fines inside the lower brine holding tank as follows: The operator will again rotate the system's lower brine holding tank down (using the system's self-contained hydraulic control system), this time with the pivoting trash screen held in the "up" position. He will then remove the secondary screen inside the lower brine holding tank and wash out the silt and other fines using a standard water spray hose.
- E. Entire system shall be constructed on a single skid frame to allow for easy loading, unloading, and moving using various loaders with forks.
- F. System shall be a "downward flow" brinemaker where the salt bed acts as a "filter bed" as the water moves down through the bed from the top spray bars. This provides for cleaner brine (less suspended solids in the finished brine) than upward flow brinemakers provide.
- G. Overall system dimensions are: 10'9" wide x 6'1" deep x 8'0" high.

II. Upper Salt Hopper:

- A. The Upper Salt Hopper shall have an approximate capacity of 6.3 cu. yds. of rock salt. It shall be 120" (10'0") wide by 63" (5'3") deep at the top to allow for easy loading with rock salt with 2 or 3 cu. yd. loader buckets. The back side of the hopper shall be angled forward (tapered). There shall also be inward tapers on the left and right sides of the lower portion of the salt hopper.
- B. The Upper Salt Hopper shall be constructed of 10 gauge, 304 stainless steel.

III. Pivoting Trash Screen:

- A. 14 gauge, 316 stainless steel trash screen shall be located at the bottom of the hopper. This screen shall have approx. 1/4" dia. circular holes through it. The screen shall be hinged on its back side and have a "normally open" securing device on its front side so it can rotate down with the Lower Brine Holding Tank, or be secured in the up position for additional cleaning of fines from the Brine Tank.

IV. Lower Brine Holding Tank:

- A. The Lower Brine Holding Tank shall be constructed of 10 gauge, 304 stainless steel.
- B. 304 stainless steel support members shall run across the Lower Brine Holding Tank at proper spacing to provide support for the trash screen above them.
- C. A 14 gauge, 316 stainless steel secondary screen shall be located approx. 6-8" from the bottom of the Lower Brine Holding Tank. This screen shall have approx. 3/16" dia. holes through it. The screen shall be removable for cleaning purposes.
- D. A 2" stainless steel female thread bung or coupling shall be welded into the back side of the Lower Brine Holding Tank.
- E. The back side of the Lower Brine Holding Tank shall be hinged and also have locking pins on the left and right front sides so it can rotate down and back up again (for cleaning purposes). The back hinges shall be 304 stainless steel.
- F. Lower Brine Holding Tank shall hold approximately 150 gallons and shall have a forward taper on its back side. It shall be approx. 94" (7'10") across its front so a standard 2 cu. yd. or 3 cu. yd. front end loader bucket can be easily positioned underneath it.

V. Skid Frame:

- A. Skid Frame shall support all other systems components including the Upper Salt Hopper, Lower Brine Holding Tank, hydraulic system, brine discharge pump, plumbing, and electrical control panel.
- B. Skid Frame shall be constructed of structural steel square tubing, 3" x 3" x 1/4", pre-cleaned with phosphoric acid & steam heat (to "etch" the steel for better paint adhesion), blown dry, and painted with a two-part epoxy primer followed by a two-part urethane top coat.
- C. Skid Frame shall have 3" x 3" x 1/4" steel bottom cross beams on each side and two across the rear. These cross beams will be located approx. 4-6" above the floor to enhance floor cleaning. The Skid Frame shall also have a steel 3" x 3" x 1/4" relocatable (bolted) front cross beam which is located along the bottom front for transport/moving using a loader with forks. After movement of the system into place is complete, this front relocatable cross beam will be moved up on the front side of the skid frame (to support the locking pins for the Lower Brine Holding Tank and trash screen).
- D. Skid Frame shall have 3" x 3" x 1/4" steel top cross beams on all four sides. It shall also have 3" x 3" x 1/4" steel diagonal beams on both sides.
- E. The entire Skid Frame is also offered in 304 stainless structural square tubing (Optional Bid Item).

VI. Hydraulic System:

- A. Hydraulic System for rotating the Lower Brine Holding Tank & trash screen down and up shall be completely self-contained (no hydraulic lines or connections required by owner).
- B. Hydraulic System shall include a hydraulic pump with integral reservoir. The hydraulic pump shall be operated by a close-coupled 2 HP, 220V, 1 Phase, Totally Enclosed (TE) electric motor. The system shall also include a pressure relief valve. Two 2 1/2" dia. hydraulic cylinders shall also be included, sufficient in size to rotate the Lower Brine Holding Tank. The cylinders shall be securely pinned to the Lower Brine Holding Tank. A hydraulic control valve shall also be included to retract and extend the hydraulic cylinders. Proper hydraulic lines and fittings shall also be included to provide a complete & fully operational system.

VII. Brine Discharge Pump:

- A. Pump shall be 2" x 1 1/2" straight centrifugal constructed of 316 stainless steel (housing, impeller & mounting feet) with viton/carbon/ceramic mechanical seal. Pump shall be close-coupled to a 3 HP, 220V, 1 Phase, TEFC motor.
- B. Pump shall be capable of producing a maximum flow rate of 160 GPM and also 70 GPM at 74' total dynamic head (TDH).

VIII. Discharge Plumbing:

- A. Discharge plumbing shall make maximum use of polypropylene "flanged" pipe fittings for quick and easy maintenance.
- B. Suction plumbing to the Brine Discharge Pump shall include a 2" EPDM suction hose with 2" check valve (on the Lower Brine Holding Tank port). It shall also include a 2" valve and camlock male adaptor for pulling finished brine from a storage tank hose. It shall also include a 3/4" fresh water inlet valve.
- C. Discharge plumbing from the Brine Discharge Pump shall include a 2" valve & camlock male adaptor for storage tank hose hook-up. It shall also include a 2" valve & hose for return of weak brine to the Upper Salt Hopper. It shall also include a 3/4" valve for sampling the finished brine concentration.

IX. Water Inlet & Spray Bar Plumbing:

- A. Water inlet plumbing shall include a 2" polypropylene valve (1 1/2" I.D.) with camlock male adaptor for water inlet hose hook-up. It shall also include a pressure gauge and PVC, Sch. 80 piping running through both the front and back sides of the Upper Salt Hopper.
- B. The water spray pipes (PVC) shall run along the entire length of the front and back sides of the Upper Salt Hopper. They shall have drill holes at proper spacing and size to concentrate solid streams of water onto the salt pile in the Upper Salt Hopper.
- C. Two 1 1/2" polypropylene swivels will be installed in the water inlet plumbing just outside the entry point of the PVC pipes into the Upper Salt Hopper. These swivels will allow the operator (with special tool provided) to rotate the water spray pipes at least 45 degrees while standing on the ground. This will allow for continued concentrating of the solid streams of water onto the salt pile even when the pile height is being reduced (when preparing for clean-out).
- D. A 2"-24V electric ball valve (1 1/2" I.D.) shall be included in the water inlet plumbing. This valve will be automatically closed when the float switch in the Upper Salt Hopper or Lower Brine Holding Tank is activated (indicating that the water inflow rate is faster than the brine pump discharge rate, or that it may be "time to clean" the system). An indicator light on the system control panel will also turn on when this water inlet valve is closed to alert the operator to either reduce the water inflow rate, or allow the system to automatically self-regulate if he chooses.

X. System Control Panel:

- A. The System Control Panel shall include a NEMA 4X (weather-tight) hinged, fiberglass, gasketed enclosure securely mounted to the skid frame.
- B. Panel shall also power disconnect switch with lock-out/tag-out, motor control, 220/24V transformer, waterproof switches (wired 24V) including "auto" switch, pump only switch, and hydraulic system switch with indicator lights. Panel also includes an indicating "time to clean" light and an indicating "reduce flow" light. Panel shall also be wired to four float switches: one to shut off the brine pump should the brine level drop too low in the Lower Brine Holding Tank (to protect the pump from running dry), two more to shut off the electric water inlet valve (when water inflow rate is faster than brine pump discharge rate; one in the Lower Brine Holding Tank and one in the Upper Salt Hopper), and one to indicate "time to clean" (in the Upper Salt Hopper).
- C. Panel shall be wired with overload protection and ready to receive 220V, 1 Phase power (power supply to panel to be direct wire in proper conduit, by owner's electrician).
- D. Electrical System shall also include flexible conduit with liquid-tight connectors from the Control Panel to the brine discharge pump and hydraulic system pump motor.

XI. Other Safety/Operational Features:

- A. System shall also include a "Time to Clean" flashing beacon which will be activated by a float switch inside the Upper Salt Hopper. The flashing beacon will activate any time the water level inside the Upper Salt Hopper rises to a predetermined level, indicating that the system may be ready for cleaning.
- B. System shall include two round "Sight Windows" in the Upper Salt Hopper. These windows will be constructed of Lexan and are positioned so the operator can see the salt level in the Upper Salt Hopper from the floor, once the salt level lowers.
- C. Both the "Time to Clean" system and the "Sight Windows" provide key safety advantages in addition to operational advantages in that no ladders will be required to check the salt or water level in the Upper Salt Hopper, or to determine when it is "Time to Clean" the system.

XII. Manuals:

- A. One Installation & Operation Manual shall be supplied with each system delivered (copies available at no additional cost).
- B. Plumbing & Wiring Schematics shall be included with the manual.

XIII. Warranty:

- A. Warranty shall begin at time system(s) are delivered.
- B. Warranty shall be for one year, including all system components & parts (labor by owner; not included).
- C. See Owner's Manual for complete safety, operations, and warranty information.