



SUBJECT OPERATION OF BARNSTEAD STILLS
 Process Specification

SUPERSEDED DATE

Initially for Model DE-200 to produce water, such as W7K, for fluorescent screen settling.

1. EQUIPMENT

One or more Model DE200 Barnstead stills of 200 gph. rated capacity, steam heated and fully automatic. This consists of two evaporators, one inside of the other. The inside evaporator is a pressure evaporator and is heated by a high pressure steam coil. The pressure in the high pressure steam coil is controlled by the pressure in the pressure-effect. The inner evaporator is surrounded by a pressure-jacket which acts as a condenser for the high pressure steam inside and as an evaporating surface for the vapor in the atmospheric-effect. The accessory equipment to the multiple-effect evaporators include a preheater for the feedwater; condenser and cooler for the product of the two evaporators. (See DS-367F)

2. PRINCIPLES OF OPERATION

The pressure-effect is heated by high pressure steam and the pressure in this effect controls the steam supply so that a constant pressure in the effect or pressure shell is maintained. The water evaporated under pressure (under 15 psi.) passes through the top parts of the evaporator into an annular space where it is condensed and delivered through a condensate trap to the condenser-cooler unit. This line has an automatic thermostatic vent to eliminate any air in this effect. In condensing this product of the pressure-effect the vapor is produced in the atmospheric-effect, which passes through a separator into the condenser where it is condensed and delivered to the cooler and the distillate delivery line. This water passes through the conductivity chamber, cell chamber, to either the waste connection if diverted or the distillate delivery outlet if satisfactory.

When the level controller on the storage tank starts the still, a circuit is closed which opens both the water feed valves and energizes the diverter. The water pressure then automatically closes both the drain valves and opens the steam supply valve to the pressure effect. The liquid level in the effects are controlled automatically by the float feeder valves. The treated feedwater passes through the preheater to the float feeder valve which automatically feeds each evaporator the proper amount of water. At the end of every 12 hours of operation, the timer automatically stops and drains the equipment for a period of eight minutes after which the equipment again automatically resumes operation.

3. DETAILS OF OPERATION

- Turn on control switch.
- Open cooling water throttling valve No. 12 one-half turn.
- Close all bypass valves and valves 8 and 9.
- Open valves on either side of the automatic diaphragm valves.
- Close valve 5.
- Open valves 3 and 4.
- Close valve 10.

As soon as pressure builds up to approximately 10 psi., adjust controller valve to hold this pressure. As soon as both evaporators are filled and distilled water is being produced, adjust valve No. 12 so that a small wisp of steam escapes from the condenser vent.

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3. DETAILS OF OPERATION (Cont.)

Normal automatic operation to start still -
 Turn on control switch.

To stop still -

Turn off control switch.
 With the control switch "ON" the level controller will automatically start and stop the still - as determined by the level in the tank.

Manual operation -

To operate this equipment manually it is necessary to close the valves on either side of the automatic steam and drain valves and water valves - and use the bypass valves as follows:

- Open cooling water by-pass valve 13.
- Open feedwater by-pass valve 14.
- Open cooling water valve 12 one-half turn.
- Open steam by-pass valve 15.
- Close valve 10.
- Open float feedwater valves 3 and 4.
- Close drain valves 8 and 9.
- Adjust throttling valve 12 so that a wisp of steam escapes from the condenser vent as soon as the equipment goes into operation.

For normal operation the pressure in the pressure-effect and the automatic condensate trap, float feeders and diverters will still be in operation.

4. SPECIAL PRECAUTIONS

- a. The apparent capacity of these stills is 175 gph. They should not be operated beyond this capacity.
- b. The effluent of the combined stills shall be tested for copper once every 8 hours. The effluent of each still separately shall be checked for copper once each week. These tests shall be logged at the power house. The stills shall not be operated beyond a positive copper test.
- c. A 1 qt. sample shall be taken once weekly and submitted to C & P Lab. for analysis of copper and soluble solids. This sample shall be taken on the effluent side of the pumps used to transfer distilled water to service. A positive test in this location can be further checked on input side of pumps to determine exact source of contaminant.
- d. The Solu-Bridge Controller shall be checked hourly. No still shall be operated at less than 400,000 ohms resistivity.
- e. If during operation, steam discharges from the atmospheric relief valve, increase the flow of cooling water to the condenser. If venting persists, throttle the steam supply until this valve closes. Under no circumstances, operate the equipment with steam discharging from this valve.

It may be necessary from time to time to adjust the steam pressure in the pressure-effect to bring the equipment up to capacity. To do this, it is merely necessary to turn adjusting nuts on steam control valve so that the pressure may be increased or decreased to maintain capacity. The maximum pressure to be used in the pressure-effect is 14 psi.

ENGINEERING SECTION
 STANDARDIZING

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