Instructions For Operation And Maintenance

12" DAMAGE CONTROL PUMP

Installed Aboard Aircraft Carrier

CV-3 U.S.S. SARATOGA

Bureau of Supplies and Accounts Contract NOS-86526
Worthington Pump and Machinery Corp. Order P-218149

Manufacturer's Serial Numbers

<table>
<thead>
<tr>
<th>Ship</th>
<th>Pump</th>
<th>Turbine</th>
<th>Priming Pump</th>
<th>Priming Motor</th>
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<td>CV-3</td>
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Average weight of Pump with Base = 3238#
" Pump weight = 2000#
" Turbine weight = 2297#
" Unit weight = 5535#
" Priming Unit weight = 275#
Operating Characteristics - Main Pump

Capacity 5000 GPM
Total Dynamic Head 60#/sq.in.
Speed 1600 RPM
Specific Gravity 1.03
Lift 20 ft.
B.H.P. 211
Pump Efficiency 83%
Water Temperature 850
W.R. - LBS./H.P./Hr. 51
Total Steam Flow - LBS./Hr. 10761

Design Steam Conditions
Steam Pressure 250#/per sq.in. G. dry saturated at 10#/""""""""""" back pressure

Emergency Steam Conditions
Steam Pressure 200#/ per sq.in. G. dry saturated at 10#/""""""""""" back pressure
Steam Pressure 250# """"""""""" dry saturated at 15#/""""""""""" back pressure
Steam Pressure 300# """"""""""",500 superheat

Description:
These units each consist of a Worthington vertical double suction, single stage centrifugal pump driven through a flexible coupling by a Sturtevant size VD-8, 211 H.P., 1600 R.P.M. vertical steam turbine, all as shown on page 12.

Operating Characteristics - Priming Pump

Capacity 40 Cu.ft./min. (Appr.)
Vacuum 15" Hg.
Speed 1750 R.P.M.
B.H.P. 2.4
Pump Efficiency 21.2%
Water temperature 600
SEQUENCE OF OPERATIONS:

When steam valve to turbine is opened it mechanically closes switch 'B' which completes circuit to Nash pump and both Nash and main pump operate together. As main pump generates 15% press. switch 'A' opens & shuts Nash pump down. When main pump press. drops to 8% Nash pump starts. On bilge condition same operations occur & when Nash shuts down the check valve in air suction line closes thus preventing backflow of air. Pressure switch to be good for max. pressure of 110° press. Check valve in air suction line prevents air from entering pump when primer is inoperative.
OPERATION.

STARTING.

1. Make sure that the oil tank is filled to the recommended level with a good clean mineral oil of the correct viscosity.

2. Open valve body and exhaust casing drains allowing all the condensate to drain.

3. Open the exhaust valve.

4. In warming up the turbine, prior to putting into service, open the main valve enough to start the bucket wheel turning over then close the valve as much as can be done without the wheel stalling. NEVER ALLOW LIVE STEAM TO BLOW MORE THAN MOMENTARILY ON A STATIONARY BUCKET WHEEL.

5. When live steam appears at the drains close them.

6. Bring the turbine up to speed slowly.

OPERATING CONDITIONS.

Under normal operating conditions these turbines will be supplied with dry saturated steam at 250# pressure per square inch gauge and exhaust against a back pressure of 10# per square inch gauge. With these conditions the performance will be:

<table>
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<tr>
<th>B.H.P.</th>
<th>R.P.M.</th>
<th>#/H.P./Hr.</th>
<th>Total #/Hr.</th>
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<td>211</td>
<td>1600</td>
<td>51</td>
<td>10761</td>
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These turbines will also deliver their rated capacities under the following steam conditions.

1. Throttle inlet steam pressure 200# per square inch gauge, dry saturated, 10# back pressure per square inch gauge.

2. Throttle inlet steam pressure 250# per square inch gauge, dry saturated, 15# back pressure per square inch gauge.

3. All parts of the turbine exposed to steam at inlet pressure must be capable of withstanding a steam pressure of 300# per square inch gauge with 50° superheat.