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BRYAN STEAM LLC

Installation and Operating Service Manual

TRAY-TYPE DEAERATOR

INSTALLATION AND OPERATION SERVICE MANUAL

Tray-Type Deaerator

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MODEL IDENTIFICATION & DESIGNATION

Tray-Type Deaerator

D T V – 150 – 125 – 25 - 2

D = DEAERATOR

T = TRAY TYPE DEAERATOR

V = TANK CONFIGURATION

- V – VERTICAL
- H – HORIZONTAL
- A – SEPARATE TANKS
- T – INTEGRAL TANKS

“150” = BOILER RELIEF VALVE SETTING

“125” = DEAERATOR SIZE RATING PPH IN 1000’S

“25” = TANK SIZE IN 100 GALLONS

“2” = NO. OF BOILER FEED PUMPS

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Section

1

Installation Instructions – Tray Type Deaerators

Note: Please read the entire instruction manual before attempting installation. Insurance and local or state regulatory codes may contain additional or more stringent requirements than those contained in this manual. Installation must conform to these codes and any other authority having jurisdiction.

Appropriate sections of the National Electric Code and ASME Code should be consulted and followed.

1.1 FOUNDATION

Before uncrating, the location should be prepared. The deaerator should set upon a good level concrete floor or 4” housekeeping pad. If the unit is not level or the floor is not in good condition, a concrete foundation should be built, the dimensions being larger than the outside dimensions of the deaerator base. Once the unit is set, final leveling may be accomplished by placing shims under the deaerator mounting feet.

NOTE

It is very important that the deaerator trays be level. Failure to install the unit level will adversely affect operation. The tray access opening must be opened and the tray stack inspected for alignment and to make sure it is level before the deaerator is put into operation.

1.2 CLEARANCES

NOTE

Adhere to all applicable local codes and NEC regarding deaerator installation and clearances.

The back of the unit can be mounted against a wall or an obstruction. The sides and the front of the unit may need room for service accessibility and clearance for piping and electrical connections. Local codes must be applied to specific installations and the minimum clearances established accordingly. If an electrical panel is supplied, the NEC requires a 36" service entrance in front of the electrical panel.

1.3 UNCRATING THE DEAERATOR

Leave the packaging material used for crating in place until ready for installation. The crating is not designed for outdoor storage; therefore the unit should be stored inside. Uncrate the deaerator and components near its permanent location. Before installation, take inventory of items that were shipped loose so they will not be misplaced. The deaerator system is most generally broken down in parts for shipping convenience. Typically the deaerator is shipped unbolted from the stand, with a box of miscellaneous parts and piping assemblies. On separable type deaerators, the storage tank and deaerator are shipped separately and will need to be reassembled in the field. These tanks are put together at the factory to verify correct alignment of the legs and piping. Please refer to the dimensional drawing to assist in reassembly of the unit.

1.4 DEAERATOR CONNECTIONS

1.4.1 GENERAL

Maintain clearances as shown on the dimensional drawing for servicing and as referenced in N.E.C. **All piping should be designed and installed to avoid any loadings on the deaerator connections or piping.** Install pump discharge piping so that accessibility and maintenance on the pumps can be done with ease and that pumps can be removed for service if required.

1.4.2 UNDEAERATED WATER CONNECTION

This connection is for the entrance of make-up water and low temperature/pressure condensate return. A spray tube is installed for proper operation of the deaerator. Verify its existence before connecting any piping to this connection. The spray tube will be marked showing the top of the spray tube.

MAKE-UP WATER

The make-up water supply will be governed by a valve, either supplied by the factory or by others. The valve will be operated based on the demand for make-up water by a controller monitoring water level in the storage section. Make-up water should only be added to the system when there is not enough condensate returning to the storage section to operate the boiler properly. Please see the manufacturer's literature for the individual valves and parts for proper installation and operation. Most control valves have a maximum pressure rating of the supply line. Verify that the supply pressure does not exceed the rating of the control valve.

CONDENSATE RETURNS

Condensate returns to the deaerator are divided into two categories.

LOW TEMPERATURE/PRESSURE CONDENSATE RETURN

Condensate is categorized as low temp/pressure if it returns to the deaerator at less than 230 deg F. These returns will be connected to the undeaerated water connection, mentioned above, so that the low pressure/temperature condensate returns and make-up water both connect to this water inlet connection. A check valve must be installed in the condensate return line near the deaerator, as shown on our standard dimensional drawings.

HIGH TEMPERATURE/PRESSURE CONDENSATE RETURNS

Condensate falls into this category if it returns to the deaerator in excess 230 deg F. These returns are connected directly to the deaerator storage section at the connection labeled high

temperature condensate return and is immediately introduced into the deaerator storage section. Condensate, whose temperature has not fallen below 230 deg F, has not absorbed oxygen from the atmosphere and does not require deaeration. Therefore, these returns can by-pass the deaeration portion and be added to the storage section. Care must be taken that these returns do not over-pressurize the deaerator or cause improper operation. A sparge tube is recommended in this connection for proper dispersment of these high temperature returns. We recommend that the pressure differential and the amount of high temperature/pressure returns are kept to a minimum and as close to the deaerator operating pressure, as possible, to avoid noise and operating problems.

There are some steam systems where the make-up water and condensate returns are collected in a transfer tank before being introduced to the deaerator. If the water in a transfer tank is under atmospheric conditions, then this water will need to be pumped into the undeaerated water connection and be controlled by a modulating valve, based on the water level in the storage section of the deaerator. Consult the factory if you have any questions regarding proper connection of the make-up water and the condensate returns.

On larger units, more than one undeaerated water connection may have been supplied. These connections need to be piped together so that flow of water will be equal in each spray tube.

1.4.3 STEAM CONNECTION

Steam connection is used for the steam supply to pressurize the deaerator to the desired operating pressure (5-15 psig). The steam supply should have a pressure-reducing valve installed in the steam line, reducing the pressure to the proper operating pressure. The relief valves will also be mounted in the steam supply line. Please see the submittal drawings from the factory for recommended piping. On low-pressure boiler systems, a pressure-reducing valve may not be required. For installation operation and maintenance of the valve, please reference the valve manufacturer's instructions supplied with the unit.

1.4.4 VENT CONNECTIONS

The vent connection is a stainless steel pipe that extends out the top of the deaerator vessel. A vent valve is supplied from the factory for proper venting. This valve must be installed.

Depending upon the size of the deaerator, more than one vent line may have been necessary. If more than one vent line extends out the top of the deaerator, they may be combined with properly sized pipe. These vent lines need to be extended vertically through the roof and open to atmosphere. An exhaust head is recommended on top of the vent line.

1.4.5 OVERFLOW CONNECTION

The overflow connection should be piped to an approved drain for gravity flow of any water that may reach the overflow level in the tank. An overflow trap needs to be supplied, since the deaerator is working under pressure at saturation point. A vent line is ran from the top of the trap to the steam atmosphere portion of the storage tank to help maintain equilibrium within the overflow trap. The overflow trap will not work properly with downstream pressure in the drain line.

1.4.6 ACCESS OPENINGS

Each tank supplied has an access opening to the trays and storage compartment. A hinged access opening is used for internal inspection of the trays and spray tubes. The opening is large enough for a tray to pass through for closer inspection or replacement. A new ring gasket should be installed after the tray door has been opened and before pressurizing the unit. When a separate tank is supplied for storage, a manway is furnished for inside inspection of the storage compartment.

1.4.7 MISC. CONNECTIONS

A drain connection and sample connection are located at the bottom of the storage area and need to be either plugged or piped accordingly. A chemical port is standard on the unit, as well as other miscellaneous couplings and connections. On separable tank design an equalizing line is pre-piped from the factory from the deaerator to the top of the storage tank. This is taken off for shipment and must be reinstalled before operation. Some deaerator models may have extra openings for optional equipment and will be plugged at the factory if they are not to be used.

1.4.8 ELECTRICAL CONNECTIONS

All electrical connections must conform to the NEC and to all other applicable State and Local Codes. Wiring to the main power terminals in the control panel (if supplied) by the contractor must have current carrying capacity equal to at least 125% of the amperage rating of the deaerator control panel. Pump motors supplied are generally multi-tapped motors and the wiring in the motors should be checked to make sure it matches the voltage being supplied. If wiring was done at the factory, the wiring diagram will be supplied with the deaerator. The power supply voltage must be as shown on the wiring diagram enclosed. Some wiring may have been loosened for shipment and needs to be checked before operation. Items to check (if supplied) are the high and low make-up water controls and the make-up water valve and controller. Please reference the wiring diagram enclosed for other optional controls that will need wired in the field.

Caution:

All control panels and controls are subject to some internal heat. Adequate boiler room ventilation must be provided.

1.5 DEAERATOR ACCESSORY EQUIPMENT

1.5.1 GENERAL

The deaerator equipment list supplied with this manual lists the components supplied with the unit. Deaerators can be supplied with different equipment and may or may not be covered in this IOM manual. Detailed information about the specific equipment supplied with this unit may be found in the manufacturers literature supplied. A brief description of the major components that may have been supplied follows:

1.5.2 TRIM PACKAGE

The trim package (if supplied) includes a high and low level float type control, gauge glass, vent valve with drilled orifice, vacuum breaker, pressure and temperature gauges, and overflow trap. Specific details of each item supplied with the unit can be found in the manufacturers literature. If additional information is required, please contact the factory with the serial number of the deaerator, along with your requested information.

The high and low level controls are external float type controls and are wired to a control panel to supply the customer with connections to indicate alarm conditions. The low level control should also be used to shut off the pumps in case the water level reaches the low level point. The vent valve is most commonly a gate valve with a 1/8" drill orifice to be installed on top of the vent pipe coming out of the top of the deaerator. A vacuum breaker is necessary in order to eliminate erratic behavior and possible damage to the unit.

1.5.3 MAKE-UP WATER ASSEMBLY

The make-up water assembly consists of an electric motorized valve with an electric type water level control to add undeaerated water to the deaerator. A pneumatic system may have been supplied as an option. The make-up water control may be used in conjunction with a transfer tank to add all the water to the deaerator or in parallel with a condensate return to only add make-up water when condensate return is not available. The valves should be installed per manufacturers recommendations and wired to the level control if removed for shipment.

1.5.4 PRESSURE REDUCING VALVE

A pressure reducing valve may be required if a boiler relief valve setting and operating pressure is above 15 psig. A pressure reducing valve is put into the steam supply line to monitor and supply steam to the deaerator for proper operation. The valve manufacturer's literature, supplied with the IOM, should be consulted for proper installation of the valve and the steam supply line. A recommended piping detail is supplied to further help in installation. It is also recommended that the relief valves be put in the steam supply line between the pressure reducing valve and the deaerator. The relief valve needs to be sized to relieve the full capacity of the pressure-reducing valve at full output. If a by-pass line is supplied around the reducing valve, it shall not be able to pass more steam than maximum capacity of the pressure-reducing valve. The PRV typically supplied is a self-contained valve and does not require any outside source for operation. However, proper installation procedures must be followed for the deaerator and the valve to work and for proper deaeration to occur.

1.5.5 FEED WATER PUMP(S)

Pumps may or may not have been supplied with your unit. Please follow the specific manufacturer's literature for operation and start-up of the pumps. It may affect your warranty and operability of your pump if specific instructions are not followed. Some pumps may need by-pass piping or a throttling valve in the discharge line to keep the pump flow at a satisfactory level on the pump curve. Pump motors are often multi-tapped. Therefore, before supplying power to the pumps, make sure the motor is wired for the proper voltage being supplied. Please follow the individual pump IOM's before operation. Some items may need to be addressed before the pump is activated.

1.5.6 OTHER OPTIONS

Additional items may have been supplied with your deaerator and can be referenced on the equipment list, wiring diagram, and/or dimensional supplied with this manual. If available, the manufacturer's literature data is supplied with this manual for proper installation and maintenance. Please consult factory if additional information is required.

1.6 PROCEDURE TO BE FOLLOWED BEFORE PLACING DEAERATOR IN OPERATION

1.6.1 INSPECT THE TRAYS

After the unit has been set, open the tray access door and inspect the trays to make sure that they are set in place and are lever. The brace used to keep the trays in place during shipment can either be removed or left in place during operation.

NOTE:

It is very important that the deaerator trays be level. Failure to install the unit level will adversely affect operation. The tray access opening must be opened and the tray stack inspected for alignment and to make sure it is level before the deaerator is put into operation.

1.6.2 CLEANING THE DEAERATOR

After installation is complete, the deaerator should be checked for debris. An access opening is supplied in each tank. For inspection of internals, the spray tube should be removed to make sure it is installed correctly and that the holes are pointing upward, as labeled on the spray tube flange. Any debris found in the tank spray tube, trays, or strainers should be removed before start-up. Mechanical floats should be checked to make sure no debris is keeping the float from operating correctly.

1.6.3 LEAK TEST OF DEAERATOR AND PIPING

After completing the deaerator installation, the piping connections, fittings, attachments and adjacent piping must be inspected for leaks by filling the unit to the overflow. Inspect all openings and fittings for leaks, removing any obstructions if necessary for proper evaluation. Although the deaerator is inspected and tested at the factory, minor leaks in fittings and attachments can develop from shipping vibrations or from installation procedures. It may be necessary to re-tighten such fittings after installation and after the deaerator has been in operation for some time.

Section

2

START-UP AND OPERATION – TRAY TYPE DEAERATOR

WARNING:

IMPROPER SERVICING AND START-UP OF THIS EQUIPMENT MAY CREATE A POTENTIAL HAZARD TO EQUIPMENT AND TO OPERATORS OR PERSONS IN THE BUILDING.

SERVICING AND START-UP MUST BE DONE ONLY BY FULLY TRAINED AND QUALIFIED PERSONNEL.

CAUTION:

BEFORE CLEANING OR REPLACING PARTS OF ANY KIND TAKE THE FOLLOWING PRECAUTIONS:

- Turn OFF and lockout all electrical disconnects to the deaerator and any other equipment or systems electrically interlocked with the deaerator.
- All cover plates, enclosures, and guards must be in place at all times except during maintenance and servicing.
- Close all valves to stop any water or steam from entering the deaerator during maintenance or servicing

OPTIONAL CONTROLS MAY HAVE BEEN SUPPLIED WITH THIS UNIT THAT ARE NOT ADDRESSED IN THIS SECTION. PLEASE REFER TO THE DEAERATOR EQUIPMENT LIST, DIMENSIONAL, AND/OR ELECTRICAL DIAGRAM FOR THEIR PURPOSE AND THEIR MANUFACTURER'S LITERATURE FOR PROPER TESTING PROCEDURES.

2.1 TEST CONTROLS

The following procedures must be followed carefully before putting the deaerator in operation. Failure to do so will present severe hazards to equipment, operating personnel and building occupants.

2.1.1 PROTECTIVE DEVICES

All controls, and low water cutoffs must be tested for proper operation before start-up.

2.1.2 MAXIMUM VESSEL DESIGN

The deaerator is designed per ASME, Section VIII, Div. 1, for a maximum allowable working pressure of 50 psig. If a pressure-reducing valve is installed in the line, a relief valve is required to be installed before operation. The relief valve can either be installed in the steam line between the PRV and the deaerator or on the deaerator itself, if an opening is available. The relief valve should be set for no greater than 50 psig and be able to relieve full capacity of the pressure reducing valve.

2.1.3 LOW WATER CONDITION

Under normal operating conditions, the tank should never be allowed to be in a low water condition. If the water level falls in the tank, the make-up valve should open to satisfy the demand for water. However, on some designs, the make-up water was only sized for a percentage of the full load and may not satisfy the boiler under high load conditions. If the low water control was supplied, it should be checked to make sure the pump circuit will de-energize on a low water condition and an alarm condition occurs.

2.1.4 HIGH WATER CONDITION

The high limit is set just below the overflow to indicate when the water is about ready to overflow to the drain. An alarm condition will occur when water reaches this level. The overflow connection needs to be working properly to keep the water from flooding the deaerator. The deaerator will not operate properly flooded.

2.1.5 FEED WATER PUMP CONTROL

There are two different designs for feed pump operation. If the feed pumps are running on an on/off basis, they will need to be electrically wired to the level control mounted on the boiler so that the boiler will maintain proper water level. If the pumps are to be in continuous operation, no wiring between the boiler and the pumps is necessary. Please reference the wiring diagram supplied with this manual for proper wiring. This connection should be checked before putting the boiler into operation, making sure that it is operating correctly, and that the right controls were supplied with the boiler.

2.1.6 BOILER FEED PUMP

The start-up procedures found in the boiler feed pump manufacturer's data should be followed very carefully and may include venting the pump before actual operation. Failure to follow the manufacturer's recommendations may void the warranty of the pump and also keep the pump from operating correctly. The boiler feed pump must also be operationally tested to assure that it provides boiler feed water at the pressure and in the amount needed for safe and reliable boiler operation. The feed pump should be capable of supplying water to the boiler at least 3% above the boiler relief valve setting. A throttling valve may be required in the discharge line to keep the pump on the operating curve.

2.1.7 OTHER CONTROLS

Additional controls, as required for a particular system, may also be provided. Refer to the literature on these devices included in the deaerator manual. All such devices must be operationally tested to assure reliable operation of the deaerator and boiler system.

2.1.8 CHEMICAL FEED SYSTEM & SOFTENER

Check the performance of the boiler water softener and chemical treatment system. Chemically test the feed water to be certain it complies with the recommendations of the chemical treatment consultant. A chemical feed quill is strongly recommended to disperse the chemical evenly in the storage section if chemicals are being added into the deaerator storage section.

2.2 OPERATING INSTRUCTIONS

2.2.1 FAMILIARIZATION WITH MANUAL(S)

The user of the deaerator and boiler system must familiarize himself with this manual to be sure he is prepared to operate and maintain the system properly.

The operating instructions should be kept in a safe place and available to all who may be working or operating the deaerator.

READ THE MANUAL BEFORE ATTEMPTING A START-UP

2.2.2 TURNING THE SYSTEM ON

Before the initial start-up of the complete deaerator system, the individual manufacturers IOM manuals should be reviewed to make sure each individual part is operating properly. **The pump manufacturers manuals should be reviewed carefully before pump operation.** If steam is available from the boiler, the pressure-reducing valve should be opened and calibrated so that 5-15 psig of steam is present in the deaerator before initial start-up. If the vent valve has not been set from previous operation, they should be opened completely.

After the deaerator is operating at a normal load, the vent valve can be adjusted so that a plume of steam comes out of the vent pipe. Trapping gases in the deaerator will cause the deaerator to not work properly. If there is no condensate return available, the make-up water bypass valve needs to be opened, allowing water to come into the deaerator, up to a normal operating level. If the boilers are being started up for the first time, feed pumps can be run to fill the boilers. If this is a new system and steam is not available, only a minimum quantity of cold water should be left in the deaerator storage tank.

Once the boilers are filled, the make-up water bypass valve can be closed for normal operation off the make-up water controller. **The feed pump should only be run after consulting the pump manufacturer's IOM manual for proper initial start-up**. When steam becomes available from the boiler, the manual valve upstream from the pressure-reducing valve should be opened slowly, introducing steam into the deaerator.

Once the deaerator is operating under normal conditions, the vent valve can be throttled back until only a plume of steam can be seen coming out the pipe. Also note that the make-up water may

be an electrically controlled valve and will need power to the control panel, as well as the pumps for operation.

CAUTION:

The vent valve adjustment should be checked periodically. The ideal vent valve setting would allow a plume of steam to exit the vent, which ensures that all escaping gasses are being properly vented.

2.3 CARE AND MAINTENANCE

Post a maintenance schedule in accordance with the recommendations in this manual. A typical schedule is included in this manual.

Section

3

CARE AND MAINTENANCE DEAERATORS

3.1 REQUIRED PRECAUTIONS DURING TEMPORARY USE

3.1.1 GENERAL

A boiler system is often utilized in new construction to provide temporary heat or for other purposes. If precautions are not taken during this time to protect the boiler system, a great deal of damage can occur before the ultimate owner takes over the building.

It is the mutual responsibility of the installing contractor and the boiler owner to consider the effect of temporary usage on the boiler system warranty. The following should be observed so as to assure the longevity of the deaerator.

3.1.2 OPERATOR SKILLS/RESPONSIBILITIES

During the temporary use period, a single person must be assigned responsibility for the care and operation of the deaerator.

This person's responsibility must include, but not be limited to, the following:

1. Knowledge of boiler system operation.

2. Possession and understanding of boiler system operating instruction manuals.

3. Assurance that the boiler system is fed with only treated water at all times and that chemical treatment and blowdown procedures are always followed.

4. Notification to the manufacturer (or manufacturer's agent) to provide start-up services if the deaerator was purchased with start-up by a factory representative.

5. Adherence to all of the start-up procedures noted in the manuals.

6. Considerations of warranty should the boiler system be used for temporary heat without adherence to the recommended start-up and operating procedures outlined in the instruction manuals.

3.2 CLEANING THE BOILER AND SYSTEM – NEW SYSTEMS

BOIL OUT PROCEDURE

The internal surfaces of a newly installed boiler will have oil, grease, or other protective coatings used in manufacturing. Such coatings must be removed since these coatings lower the heat transfer rate and could lead to overheating of a tube and reduce operating efficiency. Before boiling out procedures may begin, the burner must be ready for firing. The operator must be familiar with the procedure outlined in the boiler/burner operating instruction manuals.

In combination with system contamination, bacteria may cause objectionable odors, sometimes resembling natural gas. It is important to keep these fumes from air intake that would distribute them throughout the building. On steam humidification systems this is especially critical. Consult your local water treatment chemist for further information. Your water consultant or water treatment company will be able to recommend a cleaning or boil out procedure.

3.3 SYSTEM CLEAN OUT

Many boilers have been ruined with system contaminants such as pipe dope, cutting oil, metal shavings or chips, and other debris that are left in the piping. If these contaminants are not removed they will end up in the boiler.

SYSTEM CLEANING PROCEDURE

For steam systems, the boiler will need to be connected to the header utilizing steam to purge the piping and thus push the debris out of the system. However, at this time, all condensate must be wasted until it runs clear and water analysis of the condensate indicates that it is free of contaminants. Steam trap strainers must be periodically opened and cleaned of any debris that accumulates.

During this system clean out, the boiler make-up water must be properly softened and treated. At the conclusion of the system clean out, the condensate must be reconnected.

For existing steam systems, the installation process may have jarred debris loose. Following the boil out of the new boiler, the condensate should be wasted until it is within proper guidelines. Check all steam trap strainers to assure their cleanliness.

3.4 REPLACEMENT BOILER INSTALLATIONS: PROTECTION AGAINST CORROSION & SEDIMENT

CLEAN OR REPLACE ALL SYSTEM PIPING AND HEATING UNITS

Arrange for chemical or mechanical cleaning of the entire system. A chemical treatment company should be consulted for the proper means of any chemical cleaning.

Replace any piping considered to be deteriorated beyond safe or cleanable condition.

Flush the system clean, being certain to isolate the boiler.

DO NOT FLUSH THE SYSTEM THROUGH THE BOILER.

FILTRATION

For some old systems, there is a reluctance to clean the piping because of the possibility of leaks occurring in badly corroded lines. Should the customer refuse cleaning, it is necessary to install filtration equipment. Install either a fibrous filter or a centrifugal filter in the boiler return piping. This will collect and remove sediment from the system. A booster pump may have to be installed as well to overcome the additional pressure drop introduced in the line by the filter. When filling the system, provide chemical treatment as outlined in Section 3.5.

CAUTION

Failure to properly clean the system or to install mechanical sediment removal equipment can result in tube blockage and severe corrosion plus damage to pumps, controls, and air removal devices.

3.5 BOILER WATER TREATMENT

PURPOSE OF WATER TREATMENT

Water treatment is required for satisfactory operation of the boiler system. It must be devised to prevent depositing of scale and corrosion and other such harmful elements that may be in the water supply.

A qualified water treatment chemist should be consulted and the water systematically treated.

OBJECTIVES

The basic objectives of water treatment are:

- Prevent the accumulation of scale and deposits in the boiler system.
- Protect the boiler against corrosion.
- Maintain the highest possible boiler efficiency.
- Decrease the amount of boiler system down time from cleaning.

CONTINUOUS MONITORING REQUIRED

Water treatment should be checked and maintained whenever the boiler is operating. The boiler operator should be sure that the boiler is not operating for long periods without proper water treatment.

Water treatment may vary from season to season or over a period of time. Therefore, the water treatment procedure should be checked not less than four times a year, and possibly more frequently as the local water conditions may indicate.

All water introduced into the boiler system should be softened. The deaerator is designed to remove carbon dioxide and oxygen to 7 ppb. Either gas can cause severe corrosion in a heating system.

DRAINING AND REFILLING THE BOILER & SYSTEM

If the system is drained and then refilled, chemical treatment is essential to treat the make-up water. Use only clean, softened water

3.6 SUGGESTED MAINTENANCE SCHEDULE

DAILY

- Make visual inspection of gauges, monitors, and indicators and record readings in boiler system log.
- Make visual check of instrument and equipment settings against factory recommended specifications.
- Check operation of float controls to ensure proper functioning. The lower piping connections of float type level controls (if external float supplied) should have a suitable blowdown valve piped into a proper discharge station. This valve should be opened periodically to allow any sludge accumulated in the control to be flushed out. Consult manufacturer's instructions.
- Check pump operation. See manufacturer's data for detailed instructions.
- Inspect the vent pipe, making sure a plume of steam is coming out of the vent while the deaerator is in operation.

WEEKLY

- Confirm boiler room area is free of combustible materials and has no obstructions.
- Check all limit controls as specified in manufacturer's manual.
- Check float low water cutoff as described above.
- Make sure all fuses are in operating order.

MONTHLY

- Make visual inspection of all wiring and components.
- Confirm proper pump operation.
- Check pump strainers for cleanliness.
- Check strainers before control valves for cleanliness.

ANNUALLY

- Check operating control and other electrical components for proper operating procedures as specified in manufacturers instructions.
- The vessel and piping should be checked annually and the pump(s) inspected thoroughly.

- An operational test should be performed and system checked as in start-up procedures before staring the new heating season.

- Spray tube should be removed and trays inspected for scale or sludge build-up and cleaned, depending upon the system and water quality this may have to be done more regularly to keep the spray tube and trays in working order.

3.7 IDLE BOILER CARE AND LAY-UP

GENERAL

Corrosion damage to steam systems is often the result of improper lay-up during non-operating periods. Substantial damage can occur in only a few days if proper precautions are not taken. This damage is irreversible and will reduce boiler reliability, increase maintenance costs and eventually shorten the useful life of the boiler system.

Idle boilers are vulnerable to attack when air contacts untreated wet metal surfaces. To prevent corrosion, the metal must be protected by either keeping the surfaces completely dry or by excluding air from the system.

PRE-OPERATIONAL CLEANING AND LAY-UP

Proper lay-up techniques must be used on an idle system even if it has never been in operation. Before pre-operational lay-up, the boiler system must be chemically cleaned as outlined in Section 3.2 and 3.3 of this manual. This is required, as noted in this section, to remove preservatives, oil and grease.

LAY-UP CONSIDERATIONS

There are two basic methods of steam boiler lay-up; Wet lay-up and Dry lay-up. The method used depends on:

- The possibility that the boiler may need to be placed in operation on short notice.

- Disposal of lay-up solutions.

- Freezing potential.

Wet Lay-up is recommended for relatively short outages, such as seasonal lay-up. This method has the advantage of allowing the boiler to be brought on line with short notice. It can pose problems if there is any likelihood of freezing.

Dry lay-up is recommended for longer periods of boiler shutdown or storage. It is practical only if the boiler system can be drained hot (120^0F to 170^0F) or if external drying can be provided.

Refer to your boiler IOM manual and your standard boiler lay-up practices for idle care requirements. The same considerations should be used for the deaerator as used for the boiler.