



Steam Generators

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If a boiler generates saturated steam at 125.3 psig, how much heat is required to change the water into steam if the feed water temperature is 240°F? Illustration SG-0004

983.4 Btu/lb

Illustrations: SG0004_WM_100218
See REF2411

If the saturation pressure of water is increased, the relative values shown on the illustrated graph of SG-0001 will change. According to pertinent information found in the steam tables of SG-0004, this will result in _____. Illustration SG-0001 Illustration SG-0004

a decrease the length of line 4

Illustrations: SG0001_WM_100218, SG0004_WM_100218

Which of the following statements is true concerning the information tabulated in the table? Illustration SG-0004

When one pound of water changes to one pound of steam at 200 psia (1378.8 kPa), its volume increases 124.41 times.

Illustrations: SG0004_WM_100218
See REF2411

If a boiler generates saturated steam at 125.3 psig, how much heat is required to change the water into steam if the feed water temperature is 240°F? Illustration SG-0004

983.4 Btu/lb

Illustrations: SG0004_WM_100218
See REF2411

With reference to the chart, if a boiler generates saturated steam at 385.3 psig, how much heat per pound was required to change the water into steam if the feed water temperature was initially 104.5°C? Illustration SG-0004

1016.40 BTU

Illustrations: SG0004_WM_100218
See REF2411

If the saturation pressure of water is increased, the relative values shown on the illustrated graph of SG-0001 will change. According to pertinent information found in the steam tables of SG-0004, this will result in _____. Illustration SG-0001 Illustration SG-0004

a decrease the length of line 4

Illustrations: SG0001_WM_100218, SG0004_WM_100218

With an increase in the saturation pressure of a fluid, the value represented by line "5" on the graph will _____. Illustration SG-0001

remain virtually the same

Illustrations: SG0001_WM_100218

The main purpose of the boiler steam drum component shown in the illustration is to _____. Illustration SG-0006
prevent thermal shock

Illustrations: SG0006_WM_100218

The device shown in the illustration is a/an _____. Illustration SG-0013
desuperheater

Illustrations: SG0013_WM_100218

The device shown in the illustration is a/an _____. Illustration SG-0013
desuperheater

Illustrations: SG0013_WM_100218

According to the illustration of a typical boiler furnace rear wall, which item number would best represent "insulating block"? Illustration SG-0003

7

Illustrations: SG0003_WM_070221

According to the illustration of a typical boiler furnace rear wall, which item number would best represent "standard fire brick"? Illustration SG-0003

3

Illustrations: SG0003_WM_070221

According to the illustration of a typical boiler furnace rear wall, which item number would best represent "insulating brick"? Illustration SG-0003

1

Illustrations: SG0003_WM_070221

The items labeled "D" and "M" as indicated on the illustration are commonly called _____. Illustration SG-0020
mica sheets

Illustrations: SG0020_WM_100218

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mica sheets

Illustrations: SG0020_WM_100218

The purpose of the pressure control disk installed in the multi-nozzle soot blower, as shown in the illustration, is to _____.

reduce the steam supply pressure to the soot blower element

Illustrations: SG0023_WM_100218

According to the illustration, what part number identifies the "diffuser"? Illustration SG-0016

9

Illustrations: SG0016_WM_070221

According to the illustration, what part number identifies the "air door handle"? Illustration SG-0016

12

Illustrations: SG0016_WM_070221

According to the illustration, what part number identifies the "igniter"? Illustration SG-0016

2

Illustrations: SG0016_WM_070221

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Illustrations: SG0016_WM_070221

According to the illustration, what part number identifies the "air doors"? Illustration SG-0016

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Illustrations: SG0016_WM_070221

The illustrated burner atomizer assembly is _____. Illustration SG-0022

straight mechanical

Illustrations: SG0022_WM_100218

The illustrated burner atomizer assembly is _____. Illustration SG-0022

straight mechanical

Illustrations: SG0022_WM_100218

Valve "H" shown in the illustration, functions to _____. Illustration SG-0009

provide a quick shut off of fuel to the boiler

Illustrations: SG0009_WM_100218

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Illustrations: SG0009_WM_100218

The boiler wrapper sheet, shown in the illustration, is indicated by arrow _____. Illustration SG-0007

B

Illustrations: SG0007_WM_100218, SG0007B

The boiler superheater shown in the illustration is a/an _____. Illustration SG-0007

vertical U-type

Illustrations: SG0007_WM_100218, SG0007B

The component labeled "F" as shown in the illustration is _____. Illustration SG-0007
one of the main burner assemblies

Illustrations: SG0007_WM_100218, SG0007B

The boiler shown in the illustration, arrow "O" indicates the _____. Illustration SG-0007
soot blower elements

Illustrations: SG0007_WM_100218, SG0007B

The boiler superheater shown in the illustration is a/an _____. Illustration SG-0007
vertical U-type

Illustrations: SG0007_WM_100218, SG0007B

The component lettered "J" shown in the illustration serves as a _____. Illustration SG-0007
side water wall header

Illustrations: SG0007_WM_100218, SG0007B

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The boiler wrapper sheet, shown in the illustration, is indicated by arrow _____. Illustration SG-0007
B

Illustrations: SG0007_WM_100218, SG0007B

In the system illustrated the valves at point "A" are _____. Illustration SG-0005
stop-check/stop valves

Illustrations: SG0005_WM_100218

Which piping system is described in the illustration provided? Illustration SG-0010
Boiler feed and condensate system

Illustrations: SG0010_WM_100218

Deaeration of condensate primarily occurs in what section of the illustration shown. Illustration SG-0010
DFT

Illustrations: SG0010_WM_100218

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Boiler feed and condensate system

Illustrations: SG0010_WM_100218

Deaeration of condensate primarily occurs in what section of the illustration shown? Illustration SG-0010
DFT

Illustrations: SG0010_WM_100218

The function of item "E" shown in the illustration is to _____. Illustration GS-0099
control the admission of steam into chamber "L" as part of the process to produce sound

Illustrations: GS0099_WM_092518

The connections labeled "A" in the illustration, are used to _____. Illustration SG-0025
maintain a vacuum in the shell of the feed water heater

Illustrations: SG0025_WM_100218

See REF2385

The connections labeled "A" in the illustration, are used to _____. Illustration SG-0025
maintain a vacuum in the shell of the feed water heater

Illustrations: SG0025_WM_100218

See REF2385

The unit shown in the illustration is used as the _____. Illustration SG-0025
combined low pressure feed heater

Illustrations: SG0025_WM_100218

See REF2385

The unit shown in the illustration is used as the _____. Illustration SG-0025
combined low-pressure feed heater

Illustrations: SG0025_WM_100218
See REF2385

A slight vacuum is maintained in the shell of the first stage heater shown in the illustration. The primary reason for the vacuum is to _____. Illustration SG-0025
maintain a positive flow of steam as supplied by the main engine LP bleed system

Illustrations: SG0025_WM_100218
See REF2385

A slight vacuum is maintained in the shell of the first stage heater shown in the illustration. The primary reason for the vacuum is to _____. Illustration SG-0025
maintain a positive flow of steam as supplied by the main engine LP bleed system

Illustrations: SG0025_WM_100218
See REF2385

The items labeled "A" in the illustration are the _____. Illustration SG-0025
low-pressure vent connections

Illustrations: SG0025_WM_100218
See REF2385

The feed water heater shown in the illustration is actually comprised of three separately functioning heat exchangers. These heat exchangers are identified as the _____. Illustration SG-0025
first-stage heater, gland exhaust condenser, and drain cooler

Illustrations: SG0025_WM_100218
See REF2385

Which of the following statements is correct concerning the operation of the level or drain regulator associated with the feed water heater shown in the illustration is correct? Illustration SG-0025
The regulator controls the level of condensate collected in the drain cooler section.

Illustrations: SG0025_WM_100218
See REF2385

The feed water heater shown in the illustration was designed to maintain the required feed water outlet temperature with an approximate 10" (25.4 cm) Hg shell vacuum. If the shell vacuum is increased to approximately 16" (40.64 cm) Hg vacuum, the _____. Illustration SG-0025
feed water outlet temperature will decrease

Illustrations: SG0025_WM_100218
See REF2385

If the main condenser were operating at a vacuum of 28.5" Hg, a condensate discharge temperature of 86°F, a sea water inlet temperature of 72°F, and a sea water outlet temperature of 79°F, what would be the condensate depression? Illustration SG-0026
4 degrees Fahrenheit

Illustrations: SG0026_WM_100218

If the main condenser were operating at a vacuum of 28.5" Hg, a condensate discharge temperature of 86°F, a sea water inlet temperature of 72°F, and a sea water outlet temperature of 79°F, what would be the condensate depression?

Illustration SG-0026

4 degrees Fahrenheit

Illustrations: SG0026_WM_100218

According to the data given in illustration, which of the following would be the physical state of the fluid at a gage vacuum of 28.09 inches Hg, and 117.99 degrees Fahrenheit? Illustration SG-0026

Superheated vapor.

Illustrations: SG0026_WM_100218

According to the data given in the illustration, which of the following would be the physical state of the fluid at a gage vacuum of 29.00 inches Hg, and 85.21 degrees Fahrenheit? Illustration SG-0026

Superheated vapor.

Illustrations: SG0026_WM_100218

According to the data given in the illustration, which of the following would be the physical state of the fluid at a gage vacuum of 25.03 inches Hg, and 126.08 degrees Fahrenheit? Illustration SG-0026

Sub cooled liquid.

Illustrations: SG0026_WM_100218

According to the data given in illustration, which of the following would be the physical state of the fluid at a gage vacuum of 28.09 inches Hg, and 117.99 degrees Fahrenheit? Illustration SG-0026

Superheated vapor.

Illustrations: SG0026_WM_100218

Which of the listed types of safety valves is shown in the illustration? Illustration SG-0018

Huddling chamber type

Illustrations: SG0018_WM_100218

The popping pressure of the safety valve, shown in the illustration, is controlled by the _____. Illustration SG-0018

amount of spring compression

Illustrations: SG0018_WM_100218

Which area shown in the illustration will offer the most resistance to heat transfer from the fireside to the waterside of a boiler tube? Illustration SG-0017

B

Illustrations: SG0018_WM_100218

Which of the listed types of safety valves is shown in the illustration? Illustration SG-0018

Huddling chamber type

Illustrations: SG0018_WM_100218

The boiler shown in the illustration would be classed as _____. Illustration MO-0064

single-pass, fire-tube, scotch marine

Illustrations: MO0064_WM_101918

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Illustrations: MO0064_WM_101918

Which of the devices listed is shown in the boiler illustration? Illustration SG-0008
Integral or interdeck superheater

Illustrations: SG0008_WM_100218, SG0008B
See REF2136

The boiler shown in the illustration has its screen tubes connecting the steam drum and the component labeled
_____. Illustration SG-0008
I

Illustrations: SG0008_WM_100218, SG0008B
See REF2136

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See REF2136

Arrow "B" shown in the illustration indicates the _____. Illustration SG-0008
combustion air inlet

Illustrations: SG0008_WM_100218, SG0008B
See REF2136

In the boiler shown in the illustration, the arrow "E" indicates a _____. Illustration SG-0008
downcomer

Illustrations: SG0008_WM_100218, SG0008B
See REF2136

Which of the devices listed is indicated by arrow "H" shown in the illustration? Illustration SG-0008
Economizer

Illustrations: SG0008_WM_100218, SG0008B
See REF2136

Where is the superheater located in the boiler shown in the illustration? Illustration SG-0008
G

Illustrations: SG0008_WM_100218, SG0008B
See REF2136

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Integral or interdeck superheater

Illustrations: SG0008_WM_100218, SG0008B

See REF2136

The purpose of the separating nozzle in the accumulator of a water-tube, coil-type, steam generator is to separate

_____.

dry steam from the steam and water mixture

A variable capacity, pressure atomizing, fuel oil burner functions to _____.

provide a wide range of combustion

Fusible plugs are installed in fire-tube boilers to _____.

warn the engineer of low water level

See REF2359

Dissolved oxygen can be removed from the boiler water by _____.

treating the water with chemical scavengers

Carbon dioxide dissolved in boiler water is dangerous in a modern power boiler because the gas _____.

forms carbonic acid which attacks the watersides

Calcium minerals in boiler water are precipitated out of solution by the use of which of the listed chemicals?

Sodium phosphate

Which of the devices listed is used to keep overheated condensate from flowing to the deaerating feed tank?

Recirculating line to the main condenser

If a salinity alarm system indicates 2.5 grains per gallon at the main condensate pump discharge, your first action should be to _____.

chemically test the condensate for chloride content

While maneuvering out of port, you answer a stop bell. You notice a lot of steam coming out of the gland exhaust condenser vent, in addition to the main condenser hot well level being low. For this condition you should _____.

manually recirculate condensate and add some makeup feed

If a ship is to be laid up for an indefinite period, the steam side of the main condenser should be _____.

completely drained of water

In the boiler steam and water system, pressure is highest in the _____.

feed line

Recirculation of the feed water ensures a flow of water through the _____.
main feed pump

A single element boiler feed water regulating system used aboard ship utilizes
proportional action
See REF2394

The pressure in the feedwater system must exceed boiler steam drum pressure in order to _____.
force the feed water into the boiler

Which combustible element in fuel oil is considered a significant and major source of air pollution?
Sulfur

When burning fuel oil in a boiler, a high CO₂ content is desired in the stack gas because _____.
more heat is liberated by the production of CO₂ than CO

The entire unit which houses the burner, air scoop, air doors and bladed cone is correctly called the _____.
register assembly

Which of the following chemicals is used in an Orsat apparatus to absorb carbon dioxide?
Potassium hydroxide
See REF2397

Pumps normally used for fuel oil service are _____.
positive displacement rotary pumps

The number '29' on a fuel oil burner sprayer plate marked '2909' indicates the _____.
orifice size

In automatic combustion control systems, increasing or decreasing a loading pressure by a set amount is called _____.
biasing
See REF2402

A leaky fuel oil heater relief valve could be indicated by an increase in the _____.
discharge piping temperature

In most installations, the firing rate of a boiler using steam atomization is indicated by the _____.
fuel oil supply pressure

If the temperature of the fuel oil entering an atomizer is too low, the burner will _____.
produce heavy black smoke at any load condition

Modern day boiler automation allows bypassing the "flame safeguard" system to permit a burner to have a "trial for ignition" period during burner light off. This period may not exceed _____.
15 seconds

When excessive static boiler pressure has resulted in the initial lift of the valve disc, a huddling chamber safety valve will continue to lift open as a result of _____.
steam pressure acting on the enlarged area of projecting lip or ring

The purpose of the mica used in a boiler water gage glass assembly is to prevent _____.
etching of the glass
See REF2403

If there is a sudden drop in the outlet temperature of an uncontrolled superheater, you should _____.
check for high water level in the drum

Which of the following statements about boilers is correct?
A hot boiler will continue to generate steam after the fires are secured.

What is the cause of 'laning' in a boiler tube bank?
Excessive slag accumulation on the tubes

In a boiler equipped with an automatic feed water regulator, erratic variations in the water level could be caused by _____.
high solids content and foaming in the drum

A nozzle reaction safety valve will lift at a pressure lower than required if the _____.
spring compression is insufficient

When drying and baking are impractical, or time is not available, which of the listed materials could be used to repair both burner openings and gas baffles?
High temperature castable refractory

In what section of a boiler would you find a steam quality of 90%?
Steam drum

When heated, brickwork in a boiler is kept from buckling by the installation of _____.
expansion joints

Which of the listed procedures is the most important factor to take into consideration when making repairs to the refractory surrounding the burner openings?
Design refractory cone angle must be maintained.

A lower than normal boiler stack gas temperature usually indicates _____.
incomplete combustion

Which of the following would indicate a moderate leak in the desuperheater?
Lower than normal auxiliary steam temperature

Which of the casualties listed is apt to occur immediately after a high water casualty?
Water carryover to the turbines

Coast Guard Regulations (46 CFR Part 5 permit copper pipe to be used for steam service subjected to a maximum pressure and temperature of.
250 psi and 406°F
See REF2415

In accordance with Coast Guard Regulations (46 CFR) all fuel oil service piping in the vicinity of the burners must _____.
have wrap around deflectors on all bolted flanged joints
See REF2426

If the maximum steam generating capacity of a boiler is increased Coast Guard Regulations (46 CFR) require that the safety valve's _____.
relieving capacity be checked

All oil-fired main propulsion burners with automatic safety control systems must automatically close the burner valve when _____.

actuated by a boiler safety trip

See REF2400

The rate of heat transfer in a water-tube auxiliary boiler can be increased by _____.

installing fins on the firesides of water-tubes

When the steam pressure drops below a set value on an automatically fired auxiliary boiler, fitted with rotary cup atomizers, the combustion control system will _____.

increase the fuel oil control valve opening

Constant capacity, pressure atomizing, fuel burners designed to meet a wide variation in steaming loads on an auxiliary boiler, are _____.

cycled on and off in response to steam demand

Eight (ounces of oxygen, dissolved in 500,000 pounds of water, is a concentration of _____.

1.0 ppm

Excessive alkalinity of boiler water will cause _____.

caustic embrittlement

In the prevention of moisture carryover from a marine boiler, one important consideration is to _____.

control the amount of boiler water solids

The loop seal connected to the main condenser returns the drains from the _____.

inter condenser

The differential temperature of the main condenser cooling water will be significantly affected by a change in _____.

volume of cooling water flow

Which of the listed conditions will always result in dissolved oxygen being carried over from the main condenser?

Taking on makeup feed

Salt water contamination of condensate could occur at which component?

Fresh water evaporator

Air accumulated in the after condenser of the air ejector unit is discharged directly to the _____.

atmosphere

See REF2381

Vapor blowing from the air ejector condenser vent may be caused by _____.

insufficient condensate flow

High-pressure steam drains are normally discharged to the _____.

DC heater

If it is necessary to operate a turbine driven main feed pump at shut off head, or at less than 20% of its rated capacity, what will prevent the pump from overheating?

A bypass or recirculating line led back to the source of suction supply.

A major difference between the two element and the three element feed water regulator control systems is that a three element system will additionally measure and incorporate the _____.

feed water flow as sensed variable

Which of the following statements is correct regarding the start-up operation of a non-condensing turbine-driven feed pump?

Open the pump suction valve prior to admitting steam to the turbine.

The BTU value of fuel oil is determined by a/an _____.

calorimeter

See REF2209

Assuming all burners are clean and the fuel oil is at the correct temperature, it is considered good practice to adjust the excess air until a light brown haze is obtained. With the aid of a chemical based flue gas analyzer, the percentage readings (not necessarily in order) should indicate.

no CO, low O₂, and high CO₂

If an analysis of boiler flue gas determines there is no excess air for combustion, you should expect the nitrogen content of the flue gas to be approximately _____.

79 (%)

See REF2398

All fuel oil service pumps are equipped with a _____.

remote means of stopping the pump

The primary purpose of the sprayer plate in a mechanical atomizing oil burner is to _____.

produce a fine, swirling, uniform fuel mist

The purpose of a 'peep' hole in the boiler casing is to _____.

examine the condition of the flame

In a boiler furnace, incomplete combustion due to insufficient air yields an excess amount of _____.

carbon monoxide

See REF313

Condensate accumulation in the steam side of a fuel oil heater could result in _____.

reduced heating capacity in an operating heater

In a steam assist atomizer, the fuel oil/steam mix takes place entirely within the _____.

mixing chamber

A leaky fuel oil heater relief valve could be indicated by an increase in the _____.

discharge piping temperature

Which of the following statements represents the primary function of handholes used on a boiler?

To allow access into the headers.

The main steam stop valve on a "D" type marine boiler is located at the _____.

superheater outlet

Which of the valves listed should be closed before lighting off a boiler?

Economizer drain valve

When a boiler has been secured and is being initially cooled, the water level showing in the steam drum gage glass should be _____.

maintained at the normal level

Which color burner flame would indicate too much excess air?

Incandescent white

Oil accumulation in boiler water would _____.
cause foaming and carryover from the boiler

If a major flareback occurs to a boiler, which of the following actions should be immediately taken?
Secure the fuel to the burners.

To make temporary emergency repairs to brickwork in a boiler furnace, which of the materials listed should be used?
Plastic refractory

Steam baffles are used in the steam drum of a water-tube boiler to _____.
reduce the possibility of carryover

Which of the listed refractory materials is composed of wool fibers and clay binders?
Insulating cement

A furnace wall in which there are open spaces around the brick as a result of firebrick shrinkage, is _____.
loose and should be repaired

A high carbon monoxide content in the flue gases of a boiler indicates _____.
incomplete combustion

Which of the conditions listed could cause a boiler economizer to leak?
Water hammer.

Which action should be taken if the water level in the boiler gage glass drops out of sight and the burners fail to secure automatically?
Trip the master solenoid.

Coast Guard Regulations (46 CFR) regarding hydrostatic testing of main steam piping state that _____.
the hydrostatic test shall be applied from the boiler drum to the throttle valve
See REF2412

Coast Guard Regulations (46 CFR) for boiler fuel oil service systems require _____.
machinery driving fuel oil service pumps to be fitted with remote controls so that they may be stopped in the event of a fire
See REF2427

Coast Guard Regulations (46 CFR) permit repairs and adjustments to boiler safety valves while installed on a main propulsion boiler and may be made by _____.
the chief engineer in an emergency
See REF2417

Coast Guard Regulations (46 CFR) require that the design pressure of an economizer integral with the boiler and connected to the boiler drum without intervening stop valves shall be at least equal to _____.
110% of the drum safety valves highest set pressure
See REF2429

The tube sheets installed in a fire-tube auxiliary boiler are normally connected by _____.
fire-tubes and stay-tubes

Control of the fuel oil metering valve in an automatically fired auxiliary boiler is accomplished by a _____.
steam pressure sensing device with linkage to the damper air vanes

The primary function of a flame safeguard system, as used on an automatically fired auxiliary boiler, is to prevent

_____.
explosions in the boiler furnace

Proper use of the boiler surface blow will _____.

remove floating impurities from boiler water

Excessive carbon dioxide formed by improper chemical treatment in the boiler may cause corrosion in the _____.

condensate lines

Although accurate tests of boiler water for dissolved oxygen are difficult to obtain on board ship, you can be fairly certain of proper oxygen removal by _____.

maintaining a normal level of scavenging agents

Main condensate recirculating systems are primarily intended to _____.

provide adequate cooling water for the air ejector condensers

See REF2382

Air accumulated in the after condenser of the air ejector unit is discharged directly to the _____.

atmosphere

See REF2381

Which of the components listed prevents water from flowing back into the auxiliary exhaust line if the deaerating feed tank becomes flooded?

Check valve

Excess free oxygen in the boiler feedwater can be the result of _____.

improper operation of the DC heater

One of the basic rules applying to the operation of a single-pass main condenser is that the _____.

cooling water overboard should be about 10°F higher than the inlet temperature

See REF2390

While maneuvering out of port, you answer a stop bell. You notice a lot of steam coming out of the gland exhaust condenser vent, in addition to the main condenser hot well level being low. For this condition you should _____.

manually recirculate condensate and add some makeup feed

Which of the listed conditions aids in directing gland leak off steam from the low- pressure propulsion turbine to pass through the gland exhaust condenser?

The use of a gland exhaust fan.

Which of the following statements is correct regarding the start-up operation of a non-condensing turbine-driven feed pump?

Open the pump suction valve prior to admitting steam to the turbine.

Which type of feedwater regulator listed provides the MOST effective regulation of boiler water level under all operating conditions?

Triple-element

Recirculation of the feed water ensures a flow of water through the _____.

main feed pump

The flash point of a residual fuel oil should be used to determine the highest temperature to which the oil may be heated

_____.
in a storage tank

See REF171

A mechanical carbon dioxide recorder operates by detecting the difference between air and the _____.
specific weight of the flue gases

Generally, a 12% to 14% content of carbon dioxide in boiler flue gases indicates _____.
proper combustion of the fuel oil

Fuel oil solenoid valves at the burner fronts should be of the manual reset type to _____.
prevent the furnace filling with oil after restoration of power

The amount of oil atomized by a straight mechanical fuel oil burner depends on the sprayer plate size and the _____.
fuel oil pressure

Which of the following represents the proper color of the flame end farthest from the boiler burner during normal operations?
Bright yellow or orange

Insufficient air for combustion in a boiler furnace could result in a _____.
black stack smoke emission

The rate of fouling on the oil side of a fuel oil heater is inversely related to the _____.
flow rate of fuel oil through the heater

Compared to the return flow oil burner system, an internally mixed steam atomizer requires _____.
less excess air

See REF2401

Condensate accumulation in the steam side of a fuel oil heater could result in _____.
reduced heating capacity in an operating heater

In what section of a boiler would you find a steam quality of 90%?
Steam drum

A boiler safety valve must be capable of _____.
remaining open until a preset pressure drop occurs

A secondary function of the refractory installed in a marine boiler is to _____.
direct the flow of combustion gases

In most marine boilers, the primary reason the first few rows of generating tubes, called screen or furnace row tubes, are made larger in diameter than the rest of the generating tubes is because _____.
they require more water flow since they are exposed to the greatest heat

Where is the 'dry pipe' located in a boiler?
In the top of the steam drum

Which of the following precautions should be taken prior to lighting off a boiler?
Purge the furnace of combustible gases.

After a boiler has been taken off the line and is cooling, the air cock is opened to _____.
prevent the formation of a vacuum within the boiler

Lower boiler efficiency results from carrying too much excess air because _____.
it increases the volume and temperature of the furnace gas leaving the stack

Damaging scale can form on the interior of superheater tubes as a result of _____.
boiler water carryover

If the water level in one boiler of a two boiler plant rapidly falls out of sight, which of the following actions should be carried out FIRST?

Secure the fuel oil to that boiler.

Radial cracks have developed in the castable refractory of the burner cones after the first firing since the installation of new furnace front refractory. This is an indication of _____.

relieved stresses

The internal feed pipe in a D-type marine boiler _____.

distributes feed water evenly throughout the steam drum

Which of the listed refractory materials should be used for patching a burner front formed of plastic, castable, or tile?

Plastic fireclay

When the rate of heat transfer through tube walls is so reduced that the metal becomes overheated, which of the following conditions will result in the boiler?

Fireside burning

Which of the conditions listed would indicate excessive soot buildup on the economizer?

High superheater temperature

Which of the following actions should be carried out if the boiler water level is falling due to a tube failure?

Secure the fires and try to maintain the water level.

According to Coast Guard Regulations (46 CFR), which of the following steam piping conditions, subjected to main boiler pressure, is exempted from hydrostatic testing?

All piping with a nominal size of 3 inches or less.

See REF2416

According to Coast Guard Regulations (46 CFR), which of the following is permitted in boiler fuel oil service system discharge piping?

Screwed bonnet valves of the union bonnet type.

See REF2428

Coast Guard Regulations, 46 CFR Part 54, require steam safety and relief valves to be provided with a substantial lifting device, capable of lifting the disc from its seat at what percentage of the set pressure?

75 (%)

See REF2418

When a boiler economizer is fitted with a valved bypass, Coast Guard Regulations (46 CFR) require which of the following devices to be installed?

A stop check valve is to be located at the economizer outlet.

Assume that steam has formed in a boiler in which all of the steam stop valves are closed, and the water level is held constant. When there is an increase in the temperature of the steam and water in the boiler, which of the following effects will occur on the pressure and the specific volume of the steam?

The pressure will increase and the specific volume will decrease.

Which of the following statements concerning fire-tube boilers is correct?

Combustion gases flow through the tubes.

Why should the main steam stop valve of an auxiliary boiler be eased off its seat and then gently closed before lighting off?

To ensure that the valve will not be seized shut when hot.

A photoelectric cell installed in an automatically fired auxiliary boiler burner management system _____.
opens the burner circuit upon sensing a flame failure

Chemicals are added to boiler water to _____.
prevent scale forming deposits

A malfunction in the DC heater is indicated by _____.
the boiler requiring excessive amounts of oxygen scavenging chemicals

An adequate phosphate reserve should be maintained in boiler water to _____.
prevent hard scale formation

Which statement is true concerning two-stage air ejector assemblies?
The steam/air mixture from the main condenser is discharged by the first stage air ejector to the inter condenser.

Under normal conditions, the rate of heat transfer in a feedwater heater is most greatly affected by the _____.
temperature differential between the steam and feed water

The DC heater functions to _____.
store, heat, and deaerate feed water

If the DC heater relief valve lifts frequently, the cause can be excessive _____.
auxiliary exhaust steam pressure

Maintaining low pressure in a condensing turbine exhaust trunk _____.
enables better utilization of available heat energy to perform work

See REF2391

Scale in the air ejector first-stage nozzle could cause a decrease in the _____.
condenser vacuum

Why is it necessary to have a relief valve protecting the deaerating feed tank from internal pressure?
Because the tank receives high-pressure drains.

The main boiler feed pump discharge is controlled by the admission of steam to the auxiliary turbine. The admission of steam is normally regulated by a _____.
constant pump discharge pressure governor

When operating with the auxiliary feed line, feedwater flow is controlled _____.
manually by throttling the auxiliary feed stop-check valve

During initial starting of the standby turbine-driven boiler feed pump, which of the listed valves should remain closed?
Pump discharge check valve

Which of the significant combustible elements of fuel oil is a major source of boiler corrosion?
Sulfur

A flue gas analysis is performed to determine the _____.
correct fuel/air ratio for efficient combustion

The property of a fuel oil which is a measurement of its available energy, is known as its _____.
heating value

The temperature of the fuel oil received during bunkering operations is critical in determining the _____.
expansion space to leave in a tank

All oil-fired main propulsion burners with automatic safety control systems must automatically close the burner valve when _____.
actuated by a boiler safety trip
See REF2400

Which of the following procedures represents the proper care of unused burners during low load conditions?
They should be removed, cleaned and stored in the rack on the burner bench.

If a boiler is smoking black and increasing the boiler front air box pressure does not reduce the smoke, the cause can be _____.
dirty atomizers

If oil is found in the main fuel oil heater steam drain system, which of the actions listed should be taken first?
Shift over to the standby heater and monitor contaminated drain tank for additional traces of oil.

Boilers equipped with steam atomizers can operate over a wide load range without cutting burners in and out because _____.
steam velocity aids in the atomizing of fuel oil over a wide range of fuel pressures

The rate of fouling on the oil side of a fuel oil heater is inversely related to the _____.
flow rate of fuel oil through the heater

Circulation of water and the steam/water mixture within a natural circulation boiler is retarded by _____.
fluid friction in the downcomers, drums, generating tubes, and headers

The primary operational difference between a huddling chamber type safety valve and a nozzle reaction type safety valve is the _____.
principle by which blow down is accomplished

Boiler refractories previously baked out and fired are most sensitive to _____.
rapid cooling

In a D-type boiler, which of the tubes listed would be located in the generating tube bank?
Superheater support tubes

Which of the following statements represents one operational characteristic of a cyclone steam separator?
Unit imparts a rotational motion to the steam and water mixture.

Many steam plants are designed so that diesel oil can be provided to the burners when _____.
lighting off a cold ship

Which of the valves listed should be closed before lighting off a boiler?
Economizer drain valve

If the flue gas oxygen content is too high, you should _____.
adjust the combustion control system

Under otherwise normal steaming conditions, an abnormally high temperature at the superheater outlet of a single furnace boiler would indicate.

poor heat transfer in feed water heaters

Which of the following actions should be carried out if the boiler water level is falling due to a tube failure?

Secure the fires and try to maintain the water level.

To assure a long service life for boiler refractory materials after installation, the most effective method is to _____.
avoid rapid temperature changes and follow recommended operating procedures

Which of the following statements represents the purpose of boiler sliding feet?

To accommodate the changing length of the water drum as it expands or contracts with temperature changes.

Desuperheated steam can be found at the _____.

spray attemperator outlet

Boiler refractory firebrick is secured to the casing by _____.

slots in the brick engaging anchor bolts

After patching refractory with plastic firebrick, holes are poked in the patch on 1 1/2 inch centers in order to _____.

vent escaping moisture

Cratering and water tracking in boiler tubes is caused by _____.

water trapped between tubes and refractory

Slag buildup on boiler furnace refractory is undesirable because it causes _____.

peeling or spalling of the brickwork

If a major flareback occurs to a boiler, which of the following actions should be immediately taken?

Secure the fuel to the burners.

If the maximum steam generating capacity of a boiler is increased Coast Guard Regulations (46 CFR) require that the safety valve's _____.

relieving capacity be checked

Coast Guard Regulations (46 CFR) require that the design pressure of an economizer integral with the boiler and connected to the boiler drum without intervening stop valves shall be at least equal to _____.

110% of the drum safety valves highest set pressure

See REF2429

Coast Guard Regulations (46 CFR) require that the final setting of boiler safety valves be conducted in presence of the _____.

Marine Inspector

See REF2419

According to Coast Guard Regulations (46 CFR), feed water nozzles shall be fitted with sleeves, or have other suitable means employed to reduce the effects of temperature differentials on all boilers designed for operating pressures of _____.

400 psig (2859 kPa) or over

See REF2430

Steam tables can be used to obtain the _____.

values for properties of water and steam vapor at various conditions

See REF2432

When preparing to light off a cold boiler equipped with a return flow fuel oil system, the recirculating valve directs the flow of oil _____.

back to the suction side of the service pump

During unsafe firing conditions in a large automatic auxiliary boiler, various control actuators are interlocked with the burner circuit to prevent start-up, in addition to safety shutdown. These controls are referred to as _____.

limit controls

Before giving a boiler a bottom blow, it should be taken off the line and then the _____.

water level initially raised above normal

Normally a boiler water sample should be taken _____.

before the boiler has been blown down or chemicals added

When a boiler water test indicates a pH value of 6, you should _____.

chemically treat to raise the pH to normal level

While vacuum is being raised on the main unit and the turbine is being warmed, condensate is recirculated to the main condenser to _____.

ensure the condensation of air ejector steam

Which of the following statements represents the function of a turbine gland exhaust condenser?

Assists in preheating the condensate before it enters the DC heater.

Cooling water to the vent condenser in a DC heater is supplied by the _____.

main and/or auxiliary condensate pump

Which of the conditions listed may be indicated by the lifting of the DC heater relief valve?

A malfunctioning auxiliary exhaust make-up steam regulating valve.

If the cooling water flow through the air ejector intercondensers and aftercondensers is inadequate, which of the problems listed will occur?

Main condenser absolute pressure will increase.

A high water level in a deaerating feed heater will cause the automatic dump valve to drain condensate to the _____.

reserve feed tank

Under EMERGENCY operating conditions, the proper valve positions for controlling feedwater to the boiler should be the _____.

auxiliary stop valve fully open and the auxiliary stop-check valve used to regulate the amount of flow

While underway on watch in the engine room of a steam vessel, the proper valve positions for controlling feed water to the boiler using the auxiliary feed system should be _____.

the stop valve fully open and the auxiliary check valve used to regulate the amount of flow

A turbine-driven centrifugal feed pump used for boiler feed service should normally be stopped by _____.

hand activating the over speed trip

The temperature of the fuel oil received during bunkering operations is critical in determining the _____.

expansion space to leave in a tank

Which of the following chemicals is used in an Orsat apparatus to absorb carbon dioxide?

Potassium hydroxide

REF171

The flash point is the lowest temperature a flammable liquid can form an ignitable mixture and burn when ignited by an eternal source. The rate of vaporization at the flash point is usually insufficient to maintain continuous burning. If the flammable liquid is heated to a much higher temperature, the vapors produce at the liquid's surface will continue to ignite without needing the application of an eternal source of ignition. The temperature at which the vapors self-ignite is referred to as the ignition temperature, and it is higher than the flash point temperature. Flammable liquids give off flammable vapors at or below a temperature of 80°F. Within this class, there are three grades, based on their Reid Vapor Pressure and flash point. All liquids that burn may be grouped into these five grades. It is apparent that flammable liquids are those that may be ignited at temperatures below 80°F whereas the combustible liquids must be heated to above 80°F before they will flash. Class IA flammable liquids have a flash point below 73 °F (22.8 °C) (the upper end of the common range of room temperature) and a boiling point below 100 °F Class IB flammable liquids have a flash point below 73 °F (22.8 °C) and a boiling point greater than or equal to 100 °F (37.8 °C) Class IC flammable liquids have a flash point greater than or equal to 73 °F (22.8 °C) and below 100 °F (37.8 °C) Class II combustible liquids have a flash point greater than or equal to 100 °F (37.8 °C) and below 140 °F (60 °C) Class IIIA combustible liquids have a flash point greater than or equal to 140 °F (60 °C) and below 200 °F (93.3 °C) Class IIIB combustible liquids have a flash point greater than or equal to 200 °F (93.3 °C) Grade A refers to a flammable liquid with Reid vapor pressure of 14 pounds per square inch absolute (psia) or more. Think of a Grade A cargo as a very volatile liquid that gives off lots of vapor even at relatively low temperatures...so much vapor, in fact, that the vapor can build up considerable measurable pressure inside a closed test container. Grade B refers to a flammable liquid with a Reid vapor pressure of more than 814 pounds (psia) but less than 14 pounds Grade C refers to a flammable liquid with a Reid vapor pressure of 814 pounds (psia) or less and a flash point of 80°F or below. Gasoline with a Reid vapor pressure of 7.4 pounds (psia) and a flash point of -40°F is an example of a grade C cargo. Since gasoline's primary hazard is its flammability it is a Subchapter D cargo rather than a Subchapter O cargo where properties other than or in addition to flammability are regulated. Grade D refers to a combustible liquid with a flash point above 80°F, but below 150°F. One example is Diesel oil that is either a Grade D or a Grade E liquid depending upon its flash point, which can vary between 110°F and 190°F. Grade E refers to a combustible liquid with a flash point of 150°F or above. "Bunker C," or heavy industrial fuel oil, is an example of a Grade E liquid. Liquefied flammable gas (LFG): Any flammable gas with a Reid Vapor Pressure (RVP) above 40 pounds and that has been changed from a gas to a liquid state. 46 CFR 30.10-39. Liquefied natural gas (LNG): C■ and C■ hydrocarbons that can be liquefied either by refrigeration or by pressurization at ambient temperatures. Reid Vapor Pressure is the pressure exerted by the vapor of a liquid as determined by laboratory tests in a Reid Apparatus at a standard temperature of 100°F, expressed in pounds per square inch (absolute) (psia) according to standards established by the American Society for Testing Materials (ASTM). It is now government policy to accept meaningful civilian standards, such as this ASTM standard, wherever possible rather than to develop and enforce separate government standards.

REF2136

The Steam and Water Drum is made from a Wrapper Sheet (A) and a Tube Sheet (K). The tube sheet is pierced by different type of boiler tubes. It is thicker than the wrapper sheet to compensate for the strength lost due to the boiler tube holes in it. Air for the furnace's fire is supplied through the Air Intake(B). The Water Wall Header (C) supplies water to the water walls. (D) are the back Water Wall tubes that return to the drum. The Downcomers (E) supply water to the Mud Drum (I) that is actually a header to supply water to Generating (F) and Screen (J) Tubes. The Superheater (G) heats steam taken from the drum. The resulting steam is "superheated. " The Economizer (H) heats feed water going into the drum.

REF2181

Marine Inspector or Inspector mean any person from the civilian or military branch of the Coast Guard assigned under the superintendence and direction of an Officer in Charge, Marine Inspection (OCMI), or any other person as may be designated for the performance of duties with respect to the enforcement and administration of Subtitle II, Title 46, U.S. Code, Title 46 and Title 33, U.S. Code, and regulations issued under these statutes.

REF2209

A calorimeter is an object used for calorimetry, or the process of measuring the heat of chemical reactions or physical changes as well as heat capacity.

REF2359

A fusible plug is a threaded metal cylinder usually of bronze, brass or gunmetal, with a tapered hole drilled completely through its length. This hole is sealed with a metal of low melting point that flows away if a pre-determined, high temperature is reached. The initial use of the fusible plug was as a safety precaution against low water levels in steam engine boilers, but later applications extended its use to other closed vessels, such as air conditioning systems and tanks

for transporting corrosive or liquefied petroleum gasses.

REF2379

Acid - Base indicators (also known as pH indicators) are substances which change color with pH. They are usually weak acids or bases, which when dissolved in water dissociate slightly and form ions. Phenolphthalein is an example of an indicator which establishes this type of equilibrium in aqueous solution:

REF2380

(1.5)(24)=36

REF2381

Air in the After condenser is led out to the atmosphere.

REF2382

Note: Main condensate recirculation occurs at very low steam demands, such as while maneuvering, and is triggered by a rise in main condensate temperature. A. prevent excessive overheating of the condensate pumps. Incorrect answer. Excessive overheating of the condensate pumps is prevented by the main condensate pump casing continuous vent. B. balance and control condensate temperatures at full load. Incorrect answer. Main condensate recirculation occurs at very low steam demands. C. provide adequate cooling water for the air ejector condensers. Correct answer. At low load, there would be insufficient condensate flow to insure adequate cooling water flow for the air ejector condensers. Condensate recirculation insures adequate cooling water flow. D. vent accumulated vapors from the condensate pump discharge. Incorrect answer. Venting of accumulated vapors from the condensate pump discharge is accomplished by main condensate pump casing continuous vent.

REF2383

One vital function of the main condenser is to condense the steam exhausted from the LP turbine and return the condensate to the feedwater system via the main condensate pump.

REF2384

In a single-pass main condenser, the temperature of the cooling water should increase approximately 10 °F while it passes through the condenser.

REF2385

A feedwater heater is a power plant component used to pre-heat water delivered to a steam generating boiler. Preheating the feedwater reduces the irreversibilities involved in steam generation and therefore improves the thermodynamic efficiency of the system.

REF2386

low pressure : Incorrect answer. Drains from a ship's whistle steam separator are too hot to be drained to the low pressure drains system due to the relatively high supply pressure (150 psig). Drainage to this system would cause the atmospheric drains tank contents to overheat and flashover. high pressure : Correct answer. Drains from a ship's whistle steam separator must be drained to the high pressure drains system due to the high temperature of the drains. main turbine : Incorrect answer. There is no dedicated main turbine drain system. The design and operation of the main turbine requires separate drain systems for high and low pressure drains. contaminated : Incorrect answer. Drains from a ship's whistle steam separator are too hot to be drained to the contaminated drains system due to the relatively high supply pressure (150 psig). Additionally, the ship's whistle steam separator drains are not subject to oil contamination.

REF2387

The cooling water for the Intercondenser and Aftercondenser of the Air Ejector is the condensate from the Hot Well. This is discharged into the condensate and feed system.

REF2388

Reference: NAVPERS 10788B, Principles of Naval Engineering, Page 220

REF2389

Marine growth can prevent the cool sea water from either entering or passing through the heat exchanger that cools and condenses the steam in the main condenser.

REF2390

In a single-pass main condenser, the temperature of the cooling water should increase approximately 10 ■ F while it passes through the condenser.

REF2391

To make better use of the available energy to perform work, you must have low pressure in the turbine exhaust trunk.

REF2392

An alarm indicates high salinity at the main condensate pump discharge. High salinity will result in "salting the boiler" if not corrected. A condenser tube leak probably caused the problem.

REF2393

Condensate depression is the difference in saturation temperature of the condensate (given the pressure of the steam) and the actual temperature of the condensate. Every degree less than the saturation temperature means that that much more fuel must be burned in the boiler. Reference Material for this question courtesy of the FAME Foundation, Inc. Mass. Maritime Academy.

REF2394

Proportional action is the application of a corrective force proportional to the amount of error. While inherently stable, this produces permanent offset proportional to the load. Integral (reset) action is the application of a restoring force that is proportional to the sum of all past errors (multiplied by time) in an effort to reduce the steady-state error to zero (removing offset). The greater the error, the greater is the restoring force, which tends to produce overshoot. Derivative action is an arresting force that is proportional to the rate of change of the error and acts to prevent the oscillations associated with overshoot. With an increasing error, the corrective force associated with proportional action and the restoring force associated with reset action will aid each other. With a decreasing error, the corrective force associated with proportional action and the restoring force associated with reset action will oppose each other, not aid each other. Proportional action and reset action work in concert with each other for stable control where the steady-state error is zero (although overshoot and associated oscillations may occur).

REF2395

A check valve is located between the economizer and the boiler drain to prevent steam and water loss should a leak in the economizer occur.

REF2396

High pressure steam drains normally discharge to the DC heater.

REF2397

What is the use of Orsat apparatus? An Orsat gas analyser is a piece of laboratory equipment used to analyse a gas sample (typically fossil fuel flue gas) for its oxygen, carbon monoxide and carbon dioxide content. Although largely replaced by instrumental techniques, the Orsat remains a reliable method of measurement and is relatively simple to use.

REF2398

Flue gas is the gas exiting to the atmosphere via a flue, which is a pipe or channel for conveying exhaust gases from a fireplace, oven, furnace, boiler or steam generator. Quite often, the flue gas refers to the combustion exhaust gas produced at power plants. Its composition depends on what is being burned, but it will usually consist of mostly nitrogen (typically more than two-thirds) derived from the combustion air, carbon dioxide (CO₂), and water vapor as well as excess oxygen (also derived from the combustion air). It further contains a small percentage of a number of pollutants, such as particulate matter (like soot), carbon monoxide, nitrogen oxides, and sulfur oxides.

REF2399

Saybolt universal viscosity (SUV), and the related Saybolt FUROL viscosity (SFV), are specific standardised tests producing measures of kinematic viscosity. FUROL is an acronym for fuel and road oil.[1] Saybolt universal viscosity is specified by the ASTM D2161. Both tests are considered obsolete to other measures of kinematic viscosity, but their results are quoted widely in technical literature. In both tests, the time taken for 60 ml of the liquid, held at a specific temperature, to flow through a calibrated tube, is measured, using a Saybolt viscometer.[2] The Saybolt universal viscosity test occurs at 100 °F (38 °C), or more recently, 40 °C (104 °F). The Saybolt FUROL viscosity test occurs at 120 °F (49 °C), or more recently, 50 °C (122 °F), and uses a larger calibrated tube. This provides for the testing of more viscous fluids, with the result being approximately ■1/10 of the universal viscosity. The test results are specified in seconds (s), more

often than not referencing the test: Saybolt universal seconds (SUS); seconds, Saybolt universal (SSU); seconds, Saybolt universal viscosity (SSUV); and Saybolt FUROL seconds (SFS); seconds, Saybolt FUROL (SSF). The precise temperature at which the test is performed is often specified as well.

REF2400

46 CFR 62.35-20

REF2401

The internal-mix steam atomizer and the vented-plunger atomizer have the highest turndown ratio and provide for the smallest and most uniform particle size over their range of operation. Finely atomized fuel droplets provide more surface area for combustion and permit less excess air to be used.

REF2402

"When the station is set for manual control, the loading pressure from the Signal Selector Relay is interrupted at the Transfer Valve, and a substitute loading pressure for the operation of the Control Valve, is established through manual adjustment of the handwheel of the Bias Amplifier (Relay Sender)." "Biasing" is a term that means increasing or decreasing the loading pressure by a set amount.

REF2403

"A sheet of mica is placed between the glass and the steam and water to prevent glass etching."

REF2404

The Economizer heats feedwater entering the drum, thereby using the heat that otherwise would be lost up the stack. This prevents possible thermal shock from cold water entering the boiler and increased thermal efficiency (i.e., with less heat wasted up the stack)

REF2405

Note: Scavenging air from the windbox of a boiler is used to cool the soot blower element and to prevent the backup of combustion gases into the soot blower head when not actively blowing tubes. prevent backup of combustion gases into soot blower heads: Correct answer. As explained in the note above, the scavenging air prevents the backup of combustion gases into the soot blower head (when not actively blowing tubes). provide cooling air when soot blower elements are rotating through blowing arcs: Incorrect answer. Although scavenging air does provide a cooling function, it is when tubes are not actively being blown—not when rotating through blowing arcs. prevent buildup of soot on the element: Incorrect answer. Scavenging air has no impact on soot buildup on the element. prevent overheating of adjacent tubing: Incorrect answer. Although scavenging air does provide a cooling function when tubes are not actively being blown, this air has no impact on the temperature of adjacent tubing.

REF2406

Before "blowing tubes" you should: 1. Drain and warm the Soot Blower steam supply piping. 2. Increase the boiler water level. 3. Increase the Forced Draft for speed to blow out loosened soot.

REF2407

If the upper steam connection is obstructed, the water level in the glass will rise slowly in the glass, indicating a level increasingly higher than the actual boiler water level. Note: When the top and bottom connections of a boiler gage glass are unobstructed, continual circulation results. Steam leaves the steam space of the boiler, enters the top of the gage glass, condenses, and the resulting condensation continually drains back into the water space of the boiler. The water in the glass being slightly cooler than the water in the boiler will result in a level just slightly lower than the actual water level in the boiler. If either the upper steam connection or the lower water connection is obstructed, the water level in the glass will tend to rise above the actual boiler water level and eventually fill the glass.

REF2408

Water walls are larger diameter tubes that line the furnace floor, walls and roof. They generate steam and reduce refractory maintenance by absorbing heat. The water walls carry away much of the furnace's direct heat in the form of heated water and steam. If not for water walls, the heat would be wasted if directed at the firebricks or other refractory materials in the furnace.

REF2409

Screen tubes are larger than Generating Tubes and screen (i.e .. protect) the Generating Tubes and/or the Superheater from the radiant heat of the furnace fire. In a "D" type boiler, such as shown in both boiler illustrations , screen and generating tubes connect the Steam Drum and the Mud Drum (also called the "water drum").

REF2410

Water hammer (or, more generally, fluid hammer) is a pressure surge or wave caused when a fluid (usually a liquid but sometimes also a gas) in motion is forced to stop or change direction suddenly (momentum change).

REF2411

If a boiler generates saturated steam at 125.3 psig, how much heat is required to change the water into steam if the feedwater temperature is 240°F? STEAM - 125.3 psig + 14.7 = 140 psia (abs press psi) LIQUID - 240°F (temp °F) STEAM TEMP - 140 psia (abs press psi) = 1193 °F (sat vapor) LIQUID TEMP - 240°F (temp °F) = 208.3 °F (sat liquid) 1193 - 208.3 = 984.7 BTU

REF2412

46 CFR 61

REF2413

46 CFR 52.01-3(e)(1) 46 CFR 52.01-3(e)(6)

REF2414

46 CFR 52.01-105(e)

REF2415

46 CFR 56.10-5(c)(1)

REF2416

46 CFR 61.15-5

REF2417

46 CFR 52 46 CFR 35.25-5

REF2418

46 CFR 54.15-10(c)

REF2419

46 CFR 52.01-120(c)(2)

REF2420

46 CFR 52.01-120 : The MAWP of a boiler is 900 psi and the normal drop across the superheater is 20 psi. If the superheater safety valve is set to lift at 825 psi, the minimum settings of the drum safety valves allowed by Coast Guard Regulations would be _____. 46 CFR 52.01-120 To prevent damage to the superheater, the drum safety valve shall be set at a pressure not less than that of the superheater safety valve setting plus 5 pounds minimum plus. approximately the normal load pressure drop through the superheated and associated piping. including the controlled superheater if fitted. $825 = (\text{superheater safety valve setting}) + 5 (\text{see reg}) + 20 (\text{drop in superheater}) = 850 \text{ psi}$

REF2421

46 CFR 52.01-120(b)(2)

REF2422

46 CFR 52.01-120

REF2423

46 CFR 52.01-120(a)(5)

REF2424

46 CFR 56.50-65

REF2425
46 CFR 56.50-65(f)

REF2426
46 CFR 56.50-65(c)

REF2427
46 CFR 58.01-25

REF2428
46 CFR 56.50-65(d)

REF2429
46 CFR 52.01-95(3)(c)

REF2430
46 CFR 52.01-105(d)(2)

REF2431
46 CFR 56.97-40(a)(2)

REF2432
MARINE ENGINEERING HARRINGTON

REF306

An "accumulator" contains hydraulic oil under pressure and is ready to do "work". An accumulator is an "unfired pressure vessel" (i.e., one that does not use an outside source of heat) in which energy is stored at high pressure in the form of a gas or a gas and hydraulic fluid. An example of an accumulator would be a tank that stores hydraulic fluid under pressure that, when released, can be used to start a lifeboat engine. Such an accumulator can be designed to recharge itself as the engine runs (assuming that the engine will run) or can be recharged manually by using a hand pump.

REF313

Carbon monoxide is extremely dangerous. It is found in engine exhaust where incomplete combustion takes place. It also exists in closed spaces after a fire .