





# UNIT III


# MACHINERY

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## AUXILIARY MACHINERY

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- The machinery on board a ship can be divided into two categories;  
*main propulsion engine*  
and *auxiliary machinery*

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- The auxiliary machinery in machinery spaces includes pumps, separators, fresh water generators, heaters, coolers, oily water separator, boilers, air compressors and bow thrusters



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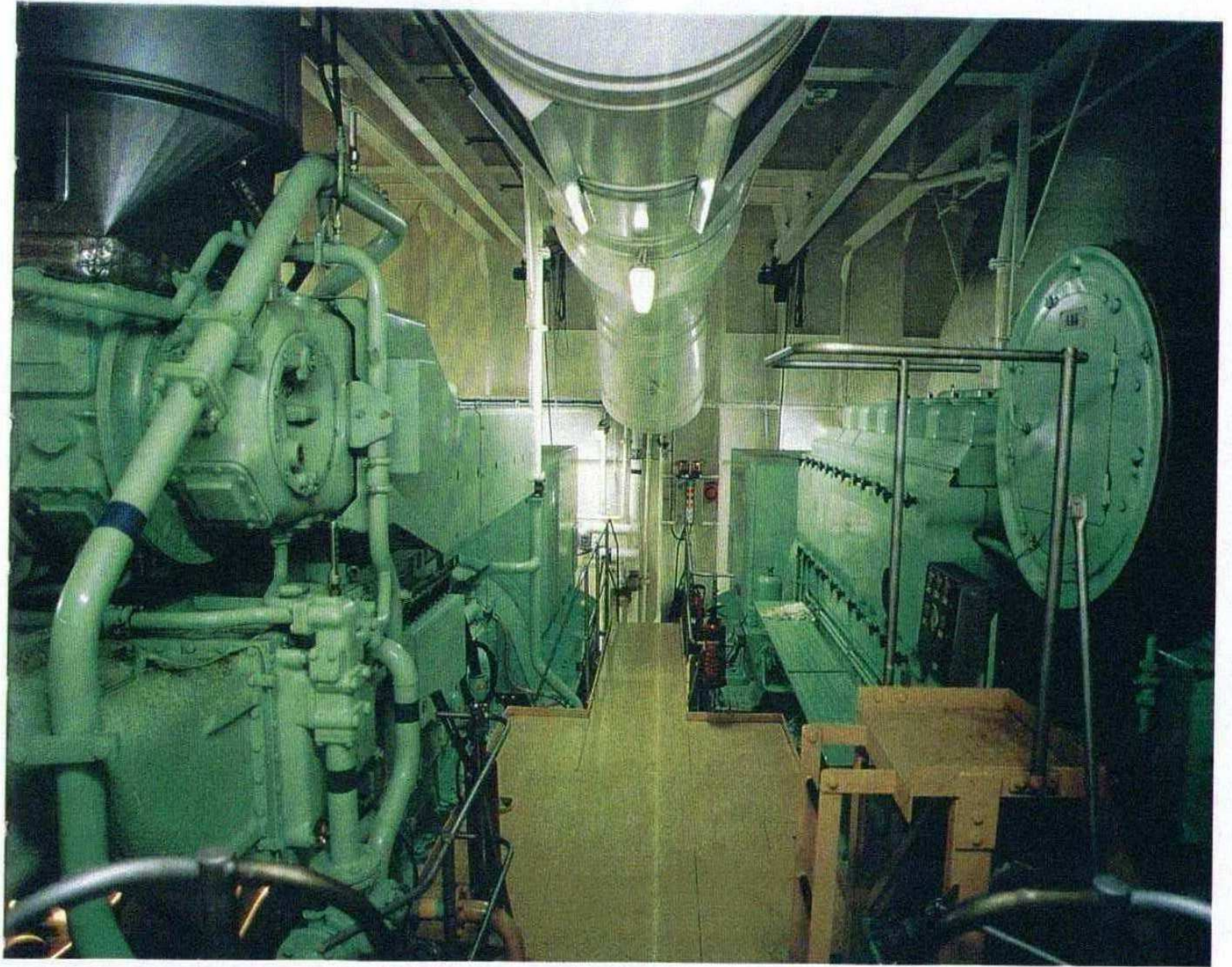
o The other auxiliary machinery used for cargo and deck operations includes steering gears, air conditioning machines, refrigerating machines, cargo winches, cranes, fire fighting installations, lifeboat engines and many others.



# GENERATOR

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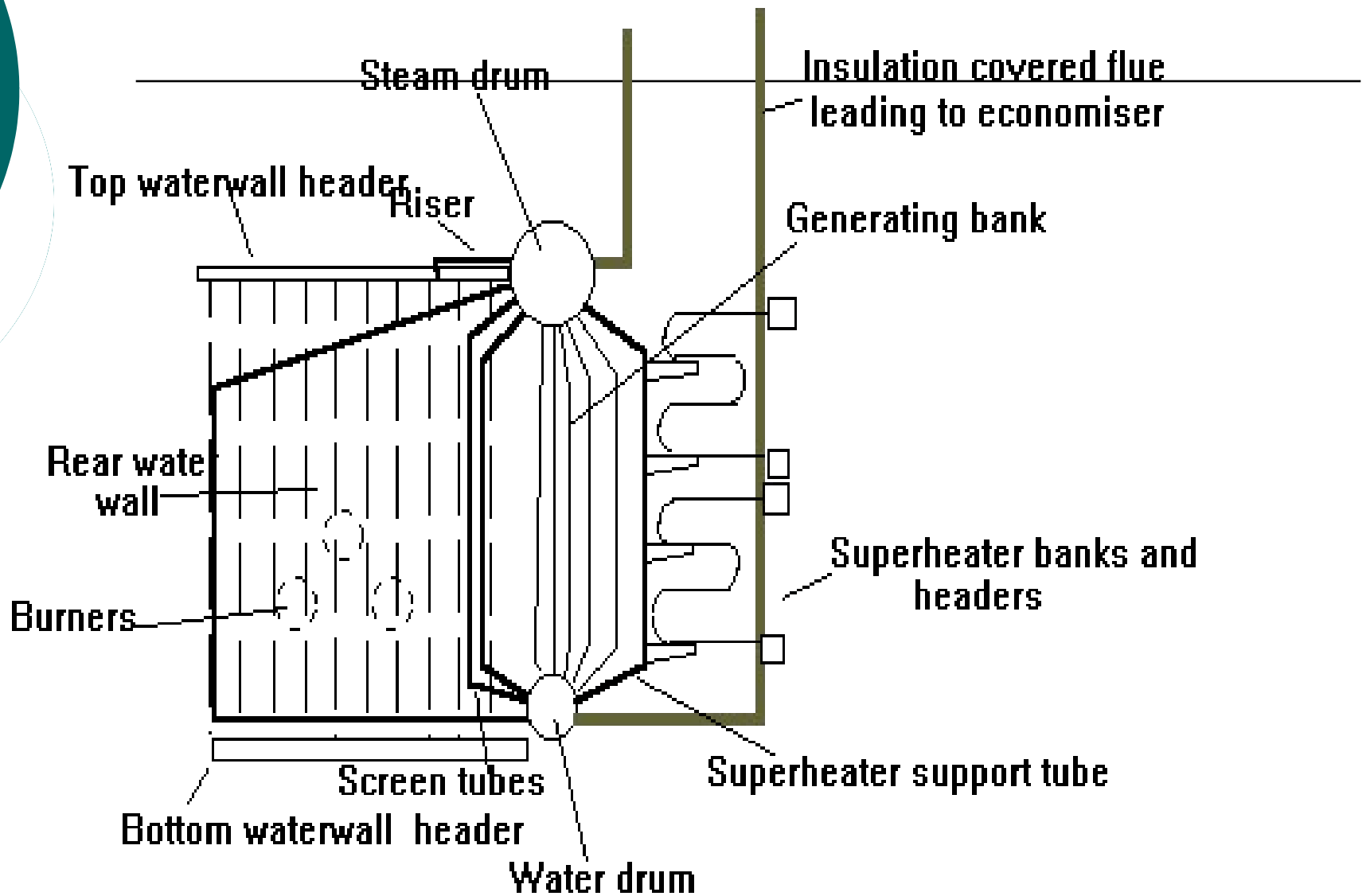
- The generators form the heart of the electrical design.
- At least two generators for a ship's main electrical power system are required by the international regulations.



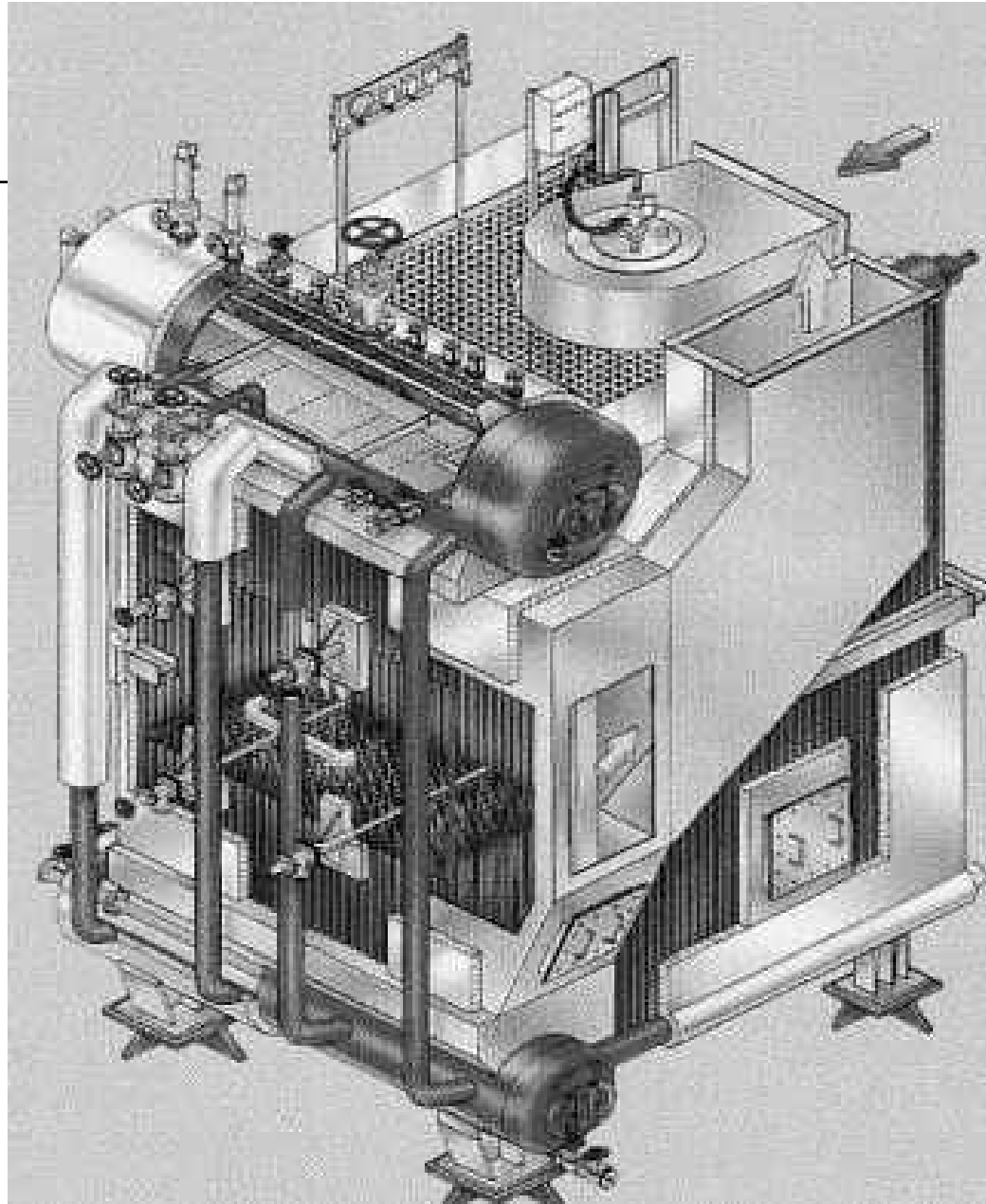
# BOILER

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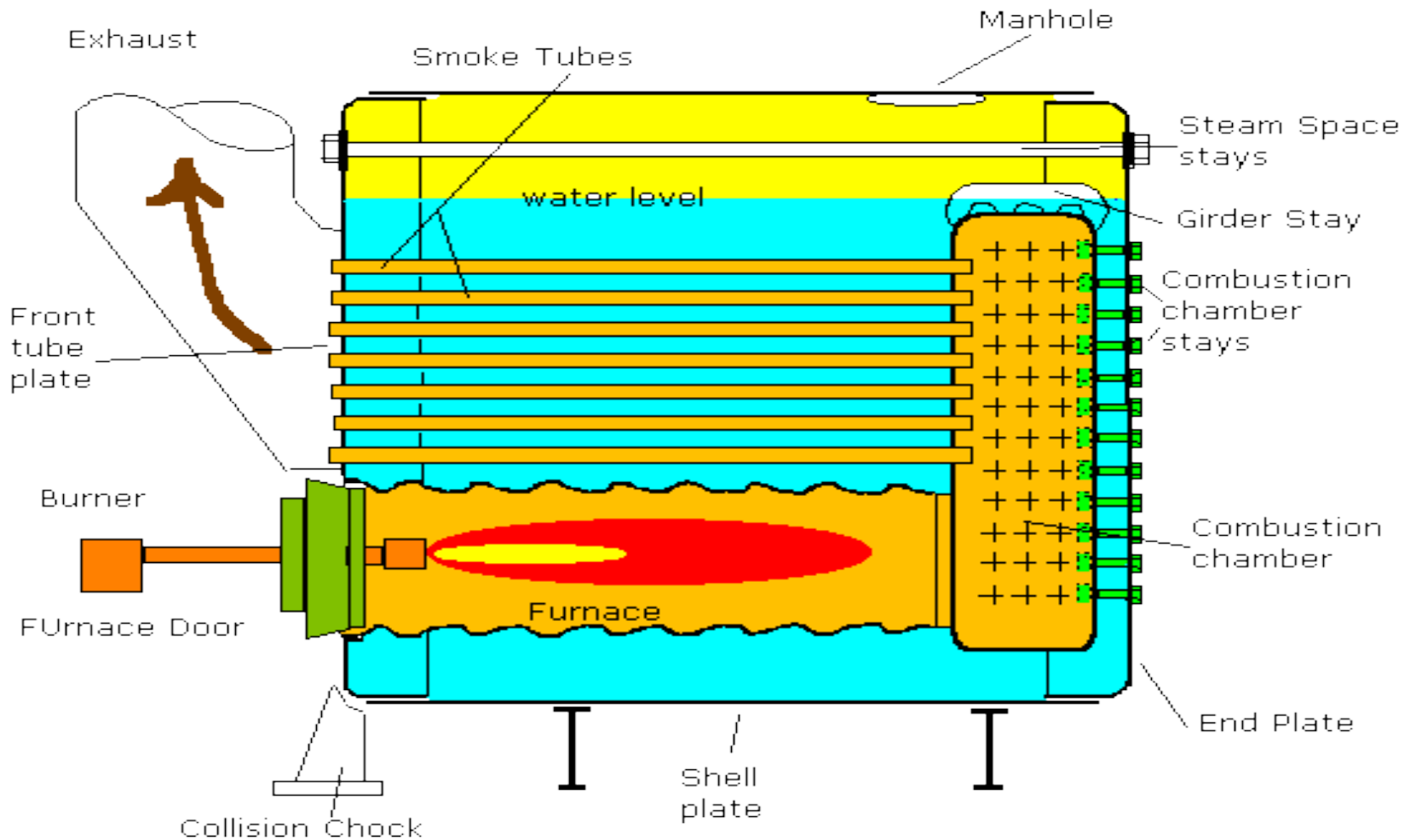
- Boilers produce steam.
- The common types of boilers are; fire-tube boilers and water-tube boilers.








# Smoke tube boiler



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- The capacity of steam production of fire-tube boilers is less than the water-tube boilers.
  - Mostly fire-tube boilers are used in ships except tankers.



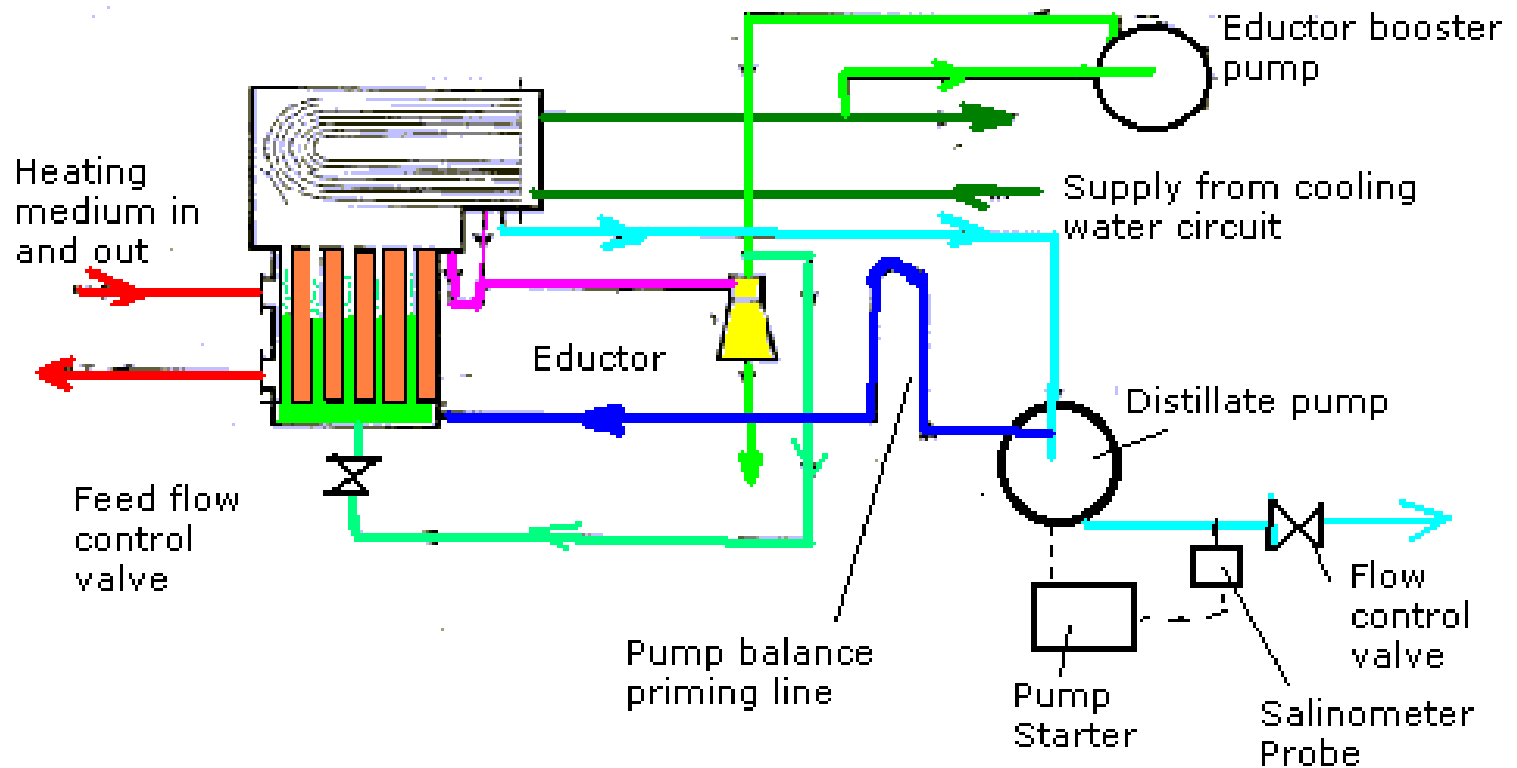
# EVAPORATOR


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- Fresh water generators (evaporators) convert the sea water to fresh water.



# Simple single effect evaporator



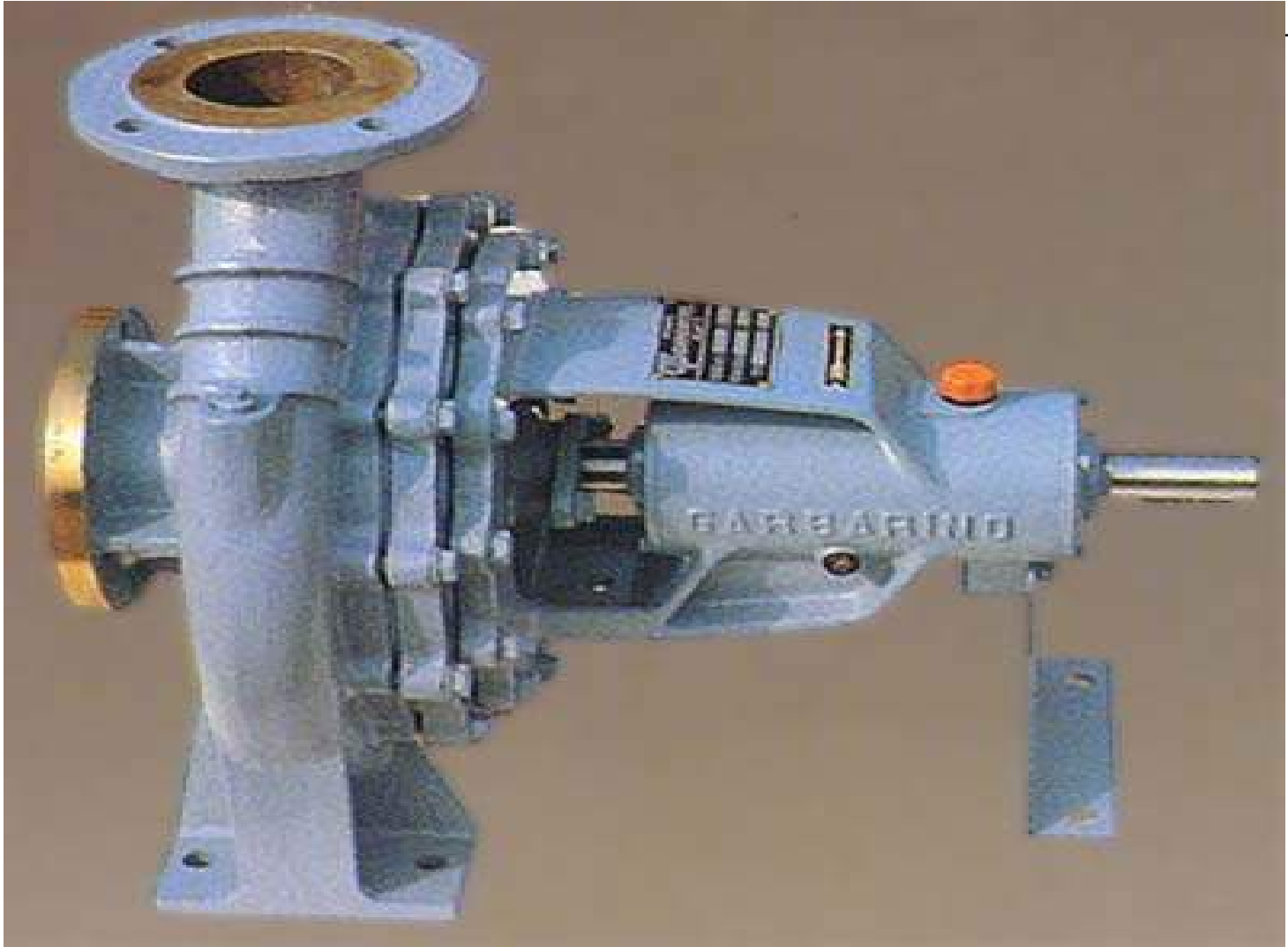
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- The most common type makes use of the ***distillation*** process. Using the heat from the engines, the sea water is ***evaporated*** under low atmospheric pressure. The vapour is then led into a cooling section and it condenses into water

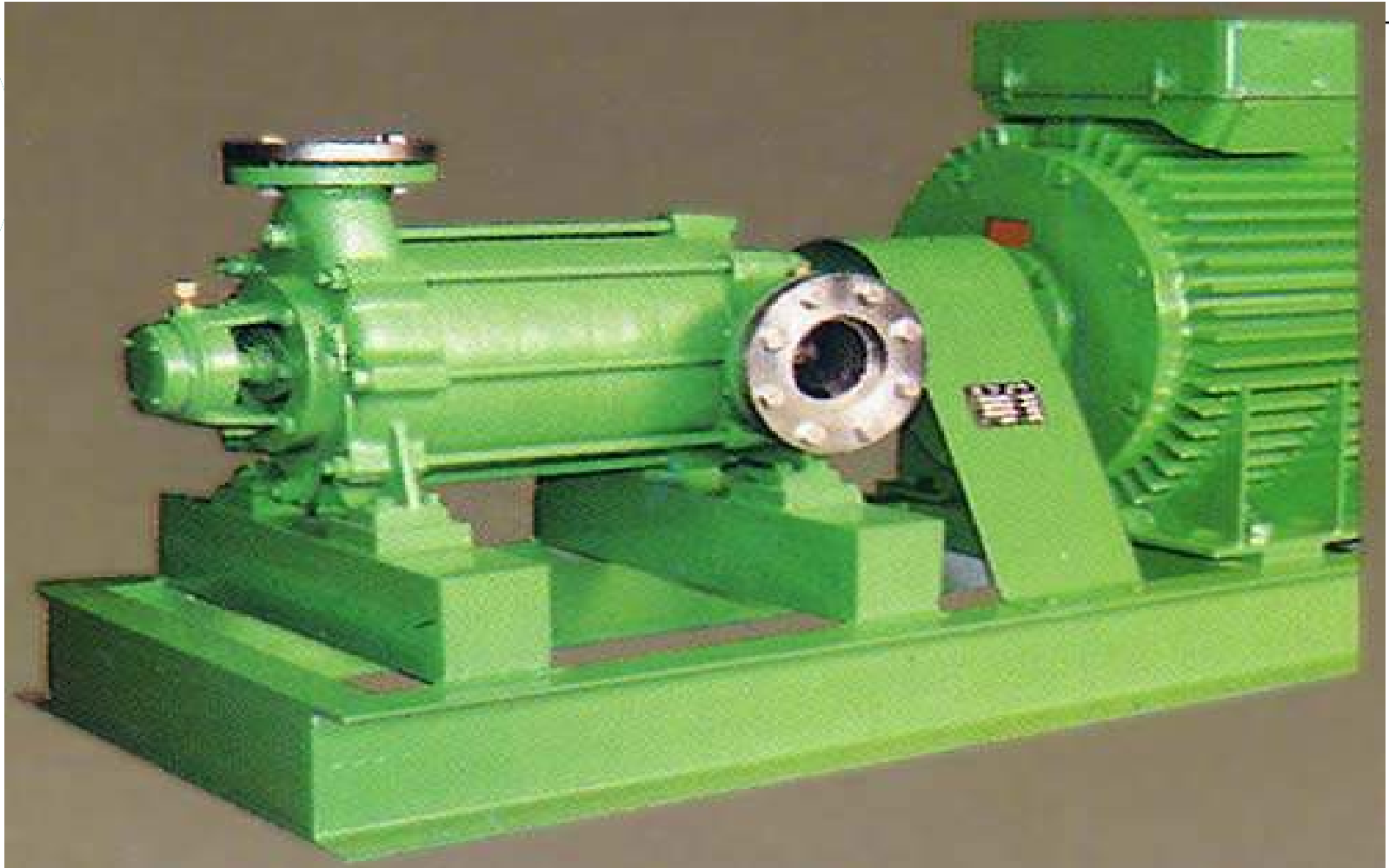
# PUMPS

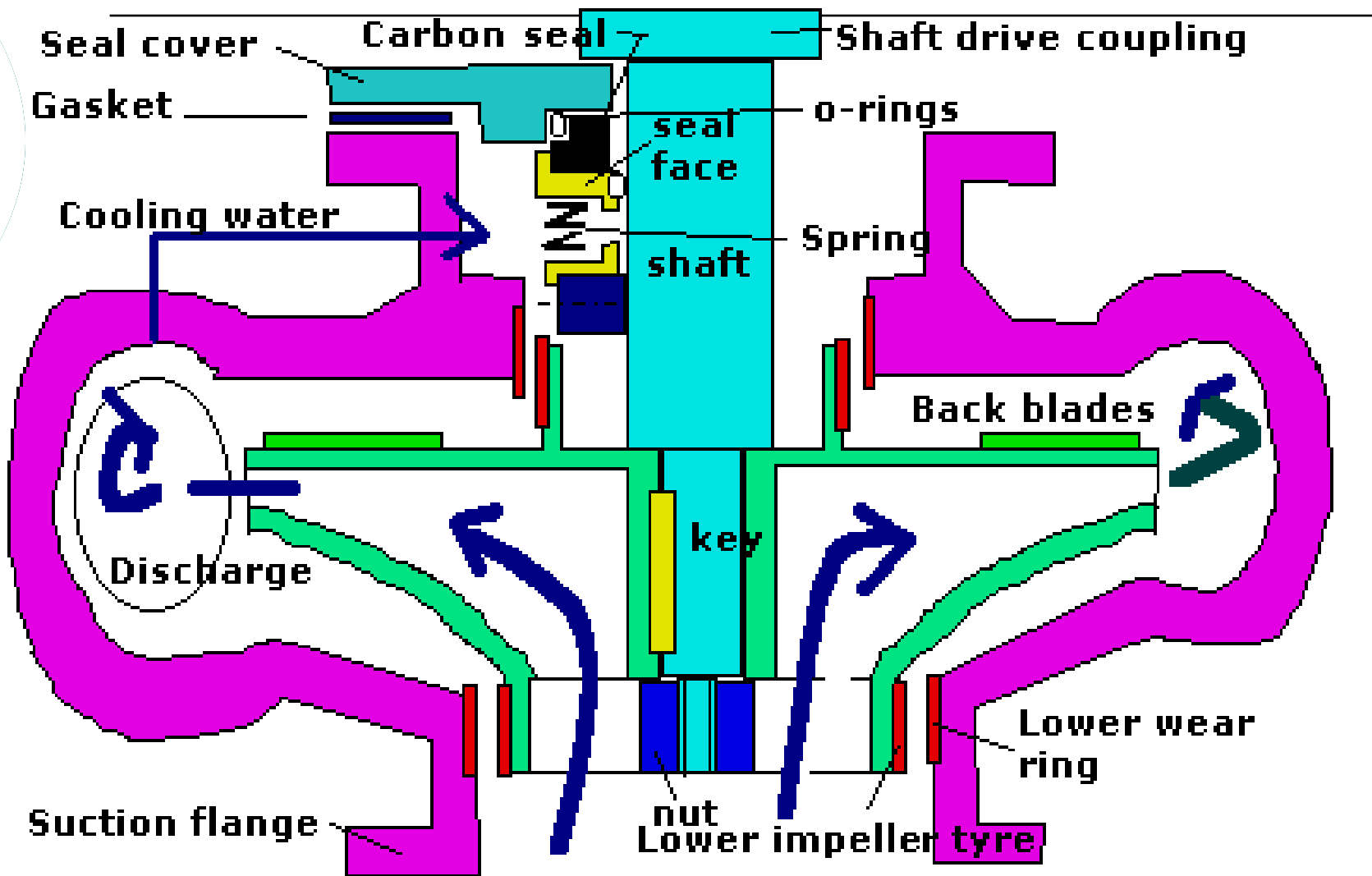
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- Pumps are the biggest group of machinery on board a ship.
- They are installed in every mechanical system that needs cooling, lubrication, and power transmission.
- They are also used to transfer fluid between tanks, for fire fighting, or washing.












# HEAT EXCHANGER

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- Heat exchangers are used to transfer heat from one medium to another. Sea water is used to cool lube oil and piston. Steam is used to heat up fuel oil.

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- Refrigeration is needed on board a cargo ship for storing of food supplies.
  - Food supplies are stored in cold rooms.
  - The cold rooms are generally vegetable and fruit room, meat room, and fish room.

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- The air-conditioning system is usually for conditioning air in the accommodation spaces.




# AIR COMPRESSOR

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- Air compressors are used to supply compressed air.





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- The compressed air is used for starting engine, control air supply, service air (e.g. air for horn).



# SEPARATORS

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- There are two types of separators; purifiers and clarifiers.
- Oil purifiers are used on board ship to condition fuel oil and lubricating oil.
- Oily water separators are used to separate oil from bilge water before the bilge is pumped.



(Above) Fuel-oil separators are set in a separate machinery space adjacent to the main engine room.

(Left) The main engine power meter indicates the instant and average output as a function of rpm.

(Right) Each C11 carries a spare piston and liner to facilitate involving cylinder maintenance.








State that the following sentences true or false according to the text.

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- **1**-Generators can be at any number on board a ship.

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- **2-**The fresh water is made by distilling

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- **3**-Oily water separator is used to separate oil and bilge water.

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- 4-The starting air is provided from purifiers.





# SOME WORDS

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**Condition (v)**-To bring into desired condition

**Distillation (n)**-Purifying a liquid by boiling it and condensing its vapours



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**Evaporate (v)**-To change into vapour

**Generate (v)**-To produce (energy)

**Purify (v)**-Remove impurities by the process of distillation


# *Write the verb forms.*


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1. Boiler → .....
2. Clarifier → .....
3. Cooler → .....
4. Exchanger → .....
5. Heater → .....

## Rewrite the sentences using gerund.

- **1-** a) *The turbine is used to generate electric power with steam.*
- b) *The turbine is used **for** **generating** electric power*

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- 
- **2**-Lubricator is used to feed the lubricating oil nozzles.

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- **3**-Boilers are used to supply steam for machinery operated by steam.

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- **4-** Fresh water generators are used to convert the sea water to fresh water.

## 8-Which is not located in the engine room?

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- a.** cooler
- b.** separator
- c.** heat exchanger
- d.** evaporator
- e.** steering gear





**8-Which is not located in the engine room?**

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**e. steering gear**



# What is used to separate oil from bilge water?

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- a.** compressor
- b.** fresh water generator
- c.** separator
- d.** heat exchanger
- e.** cooler



**What is used to separate oil from bilge water?**

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**c. separator**