



UNIT III

MACHINERY

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

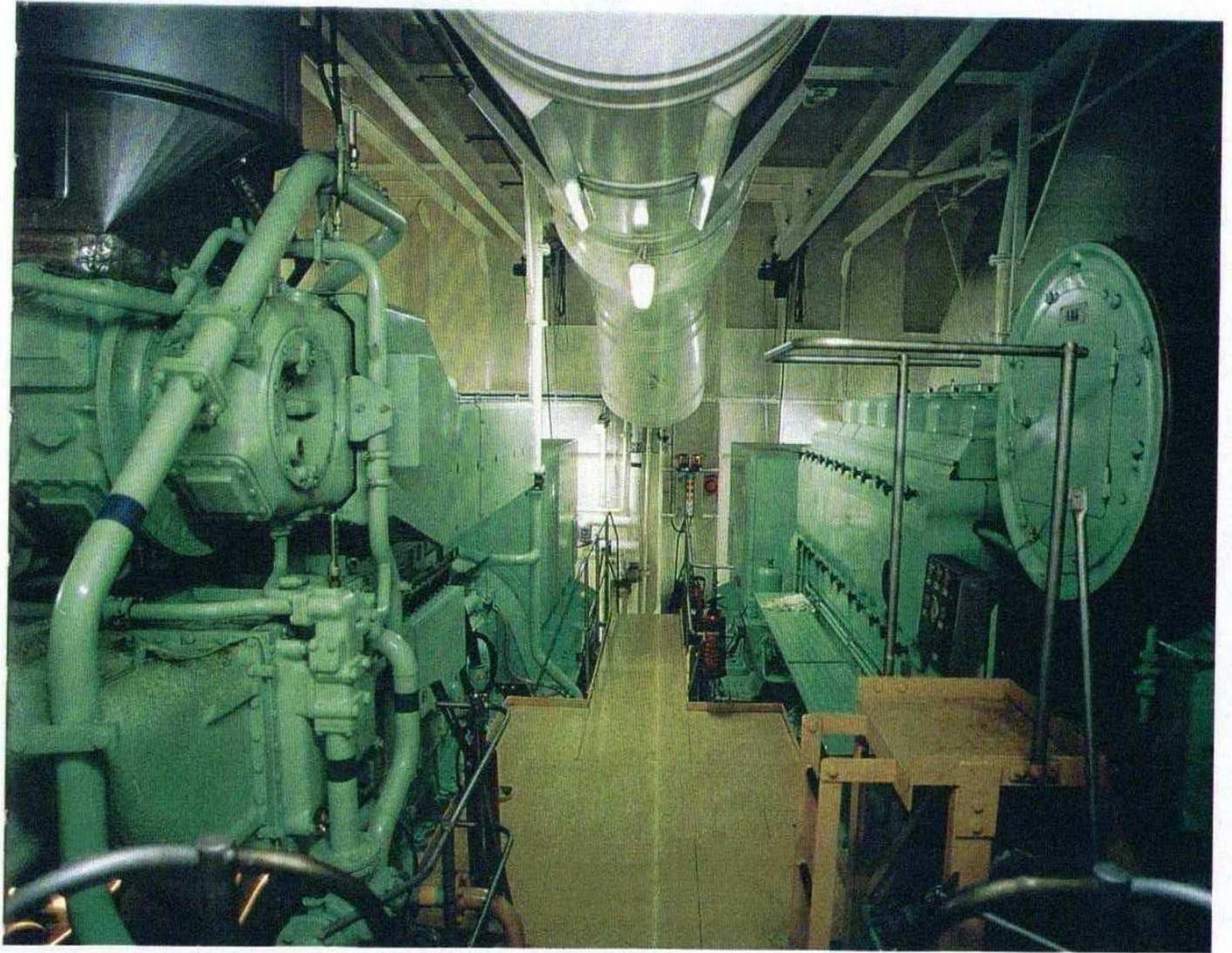


o The other auxiliary machinery used for cargo and deck operations includes steering gears, air conditioning machines, refrigerating machines, cargo winches, cranes, fire fighting installations, lifeboat engines and many others.



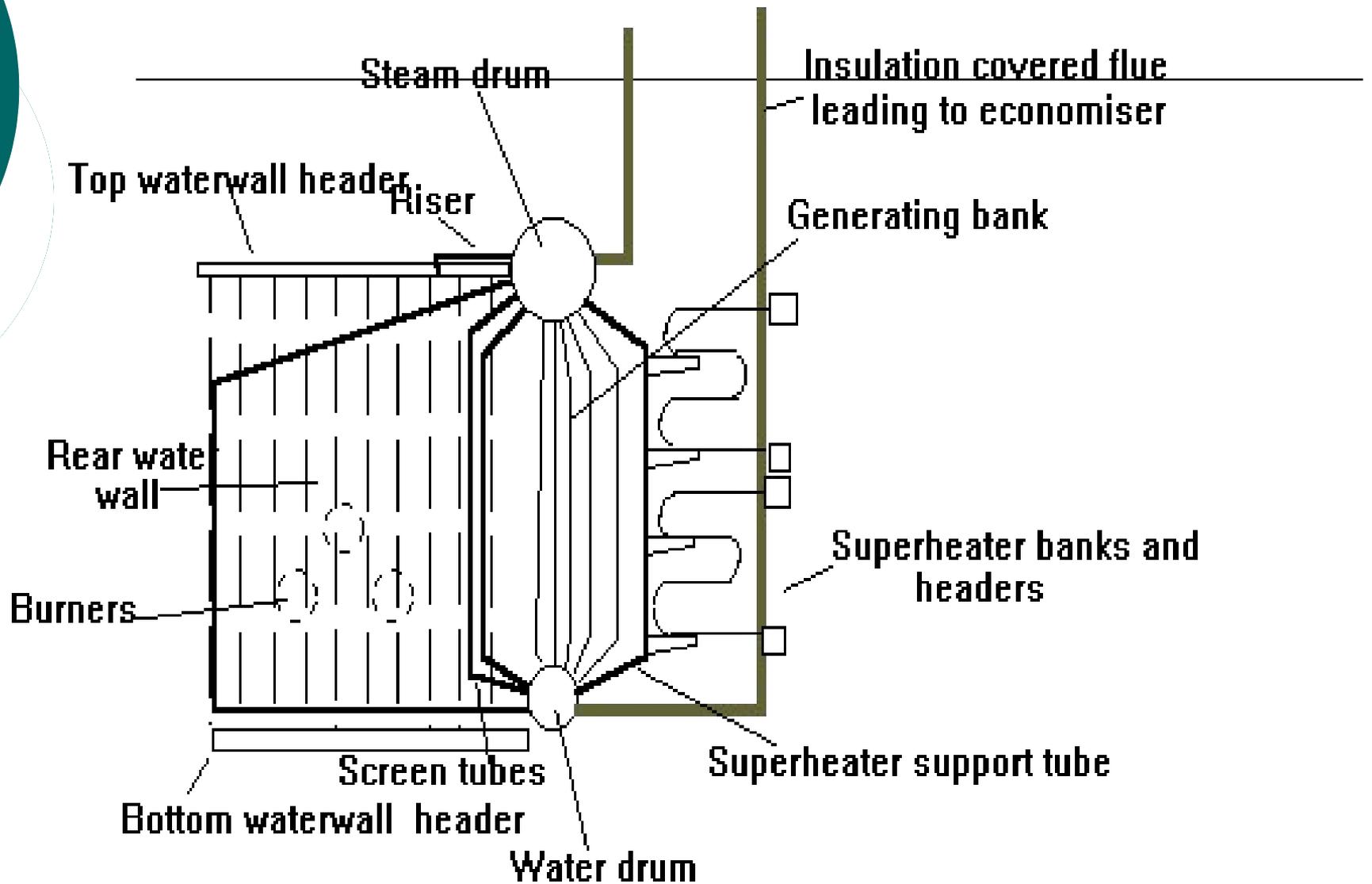
GENERATOR

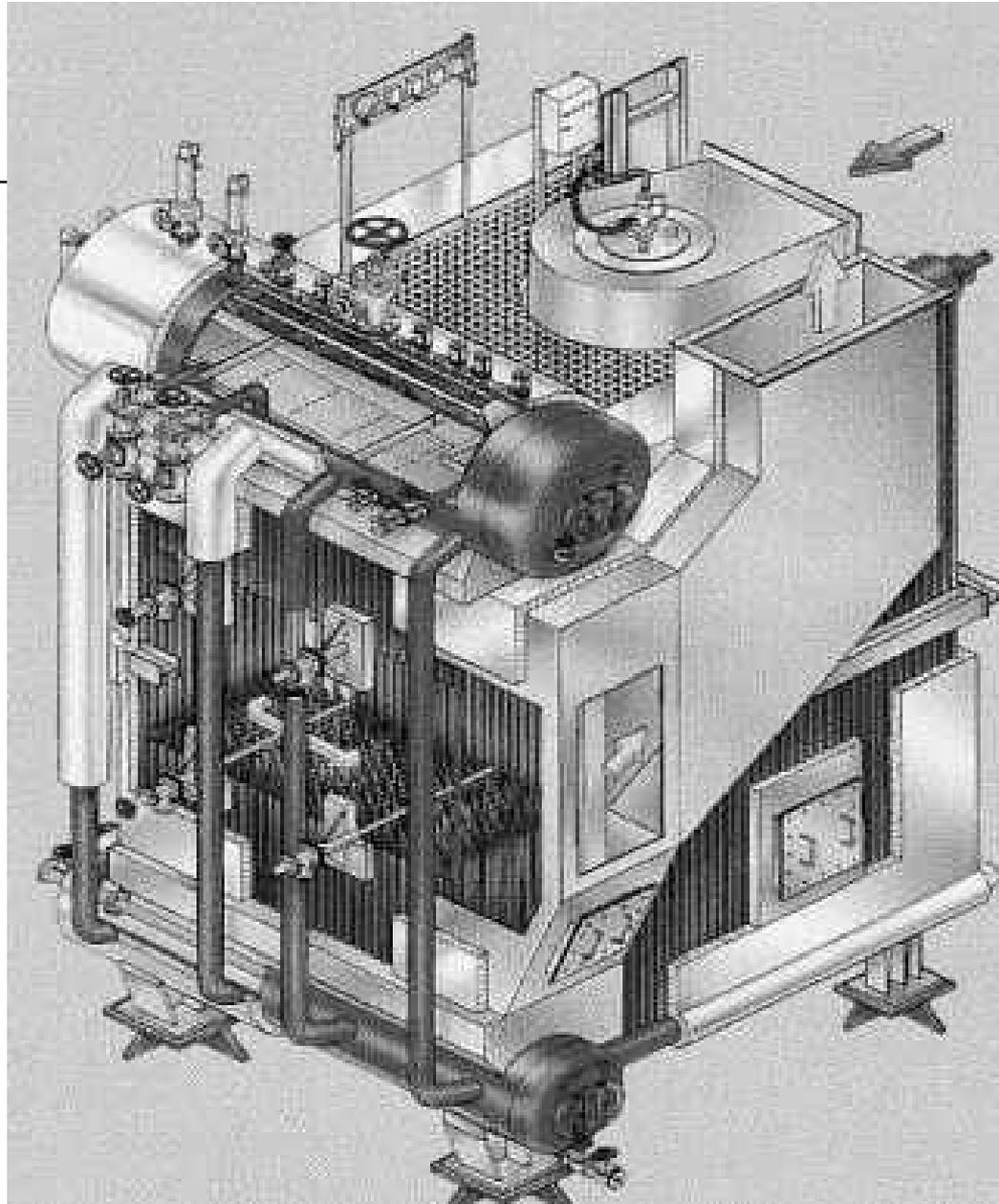
- The generators form the heart of the electrical design.
- At least two generators for a ship's main electrical power system are required by the international regulations.



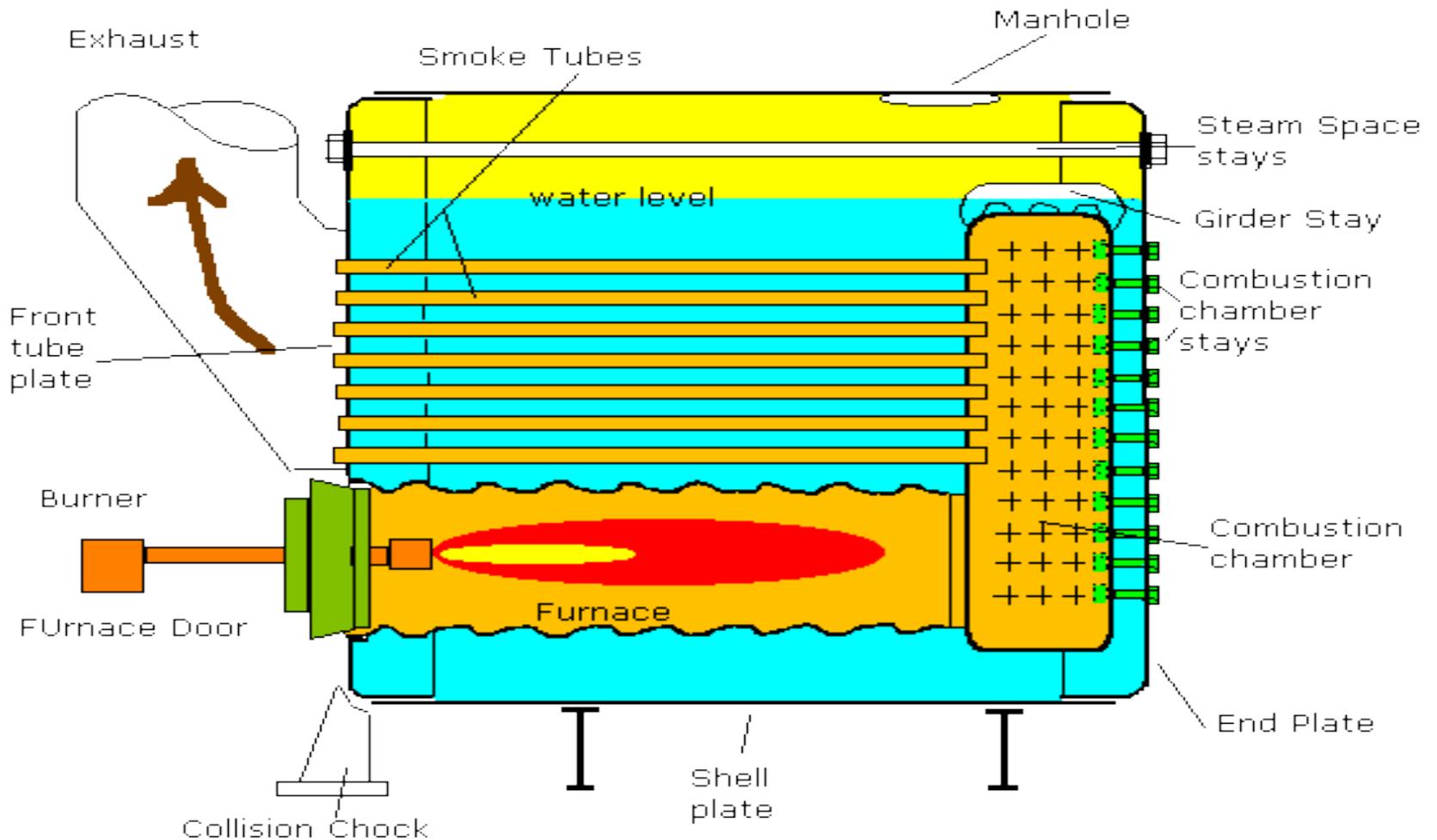
BOILER

- 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.

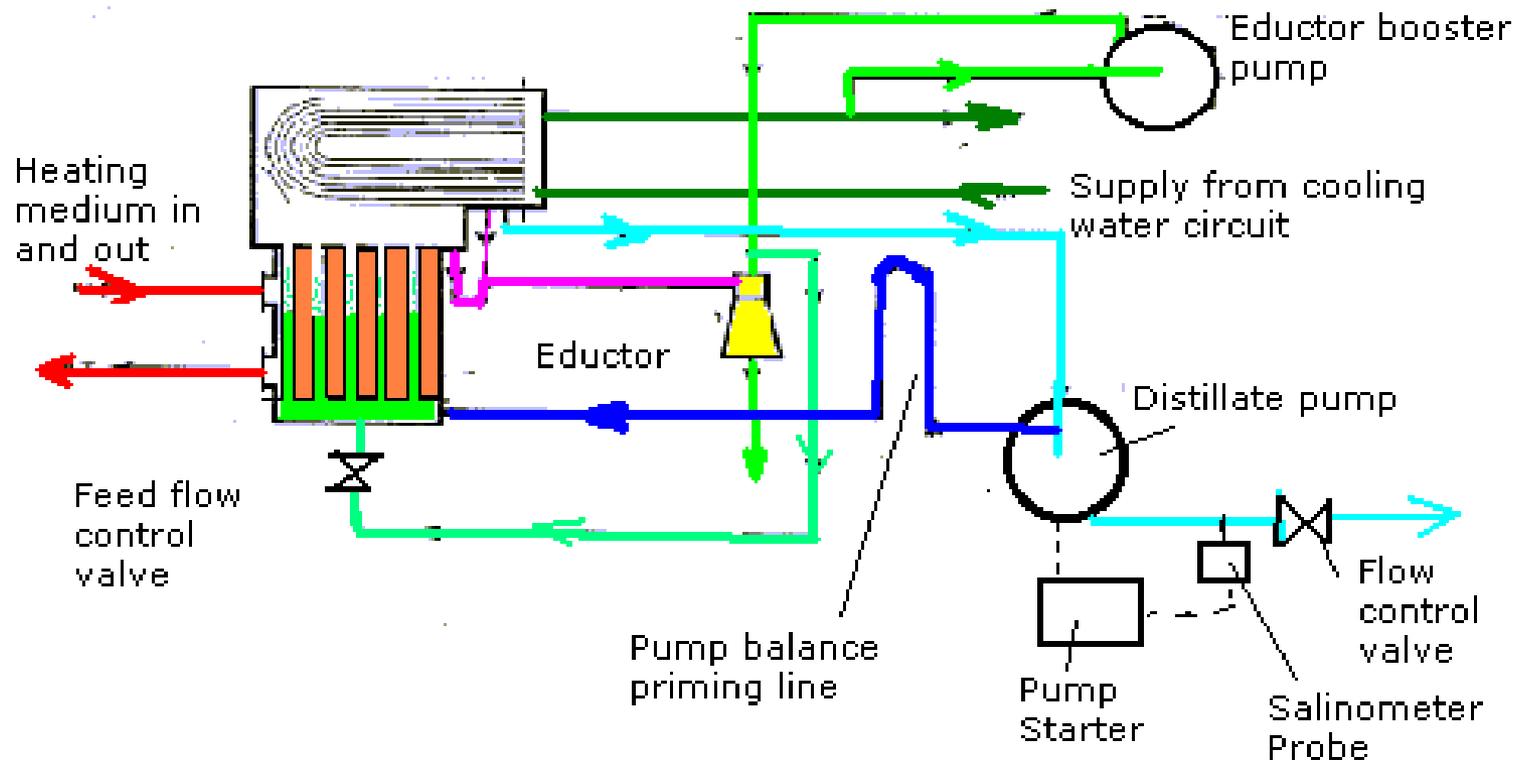


EVAPORATOR

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



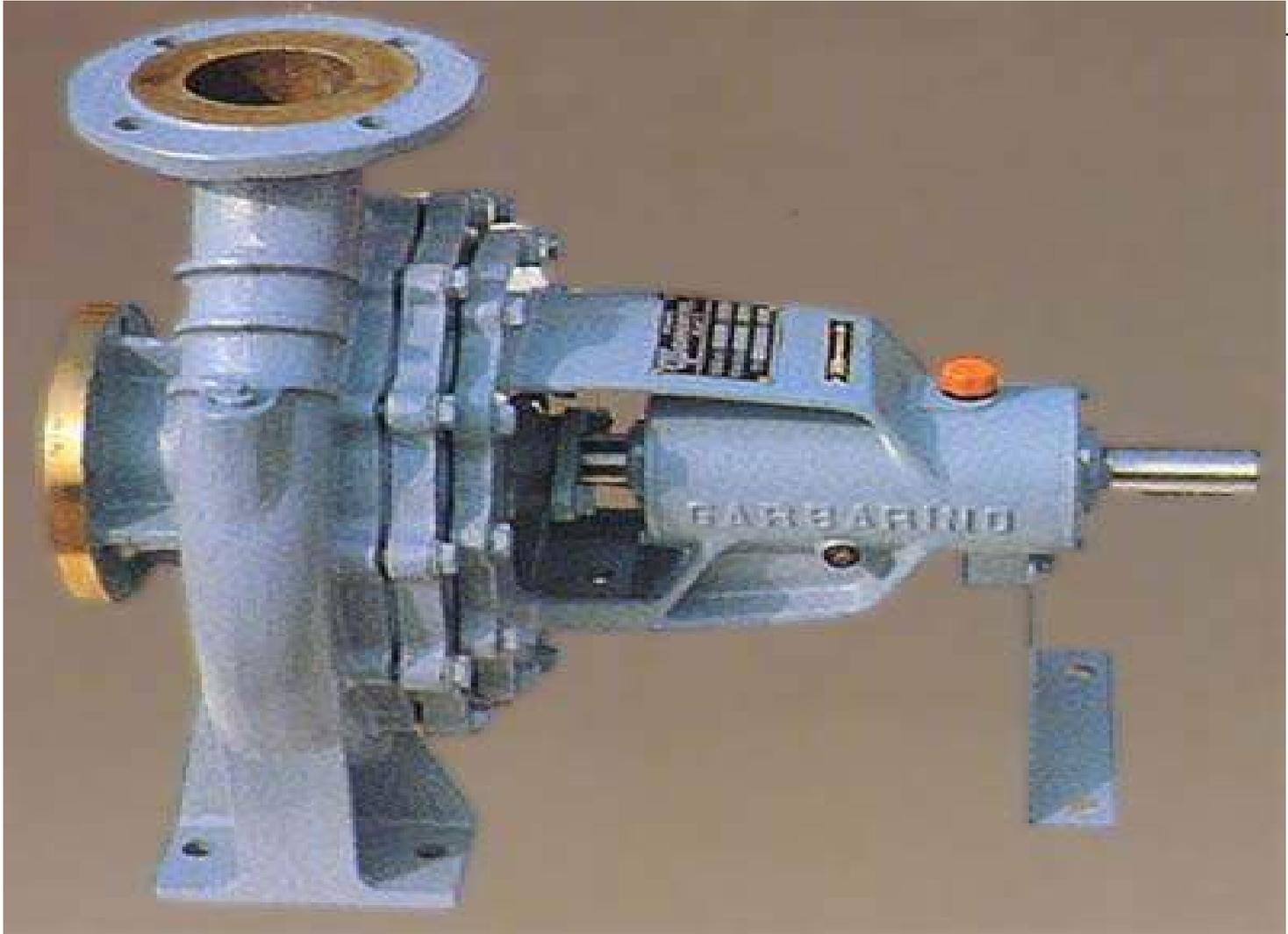
Simple single effect evaporator

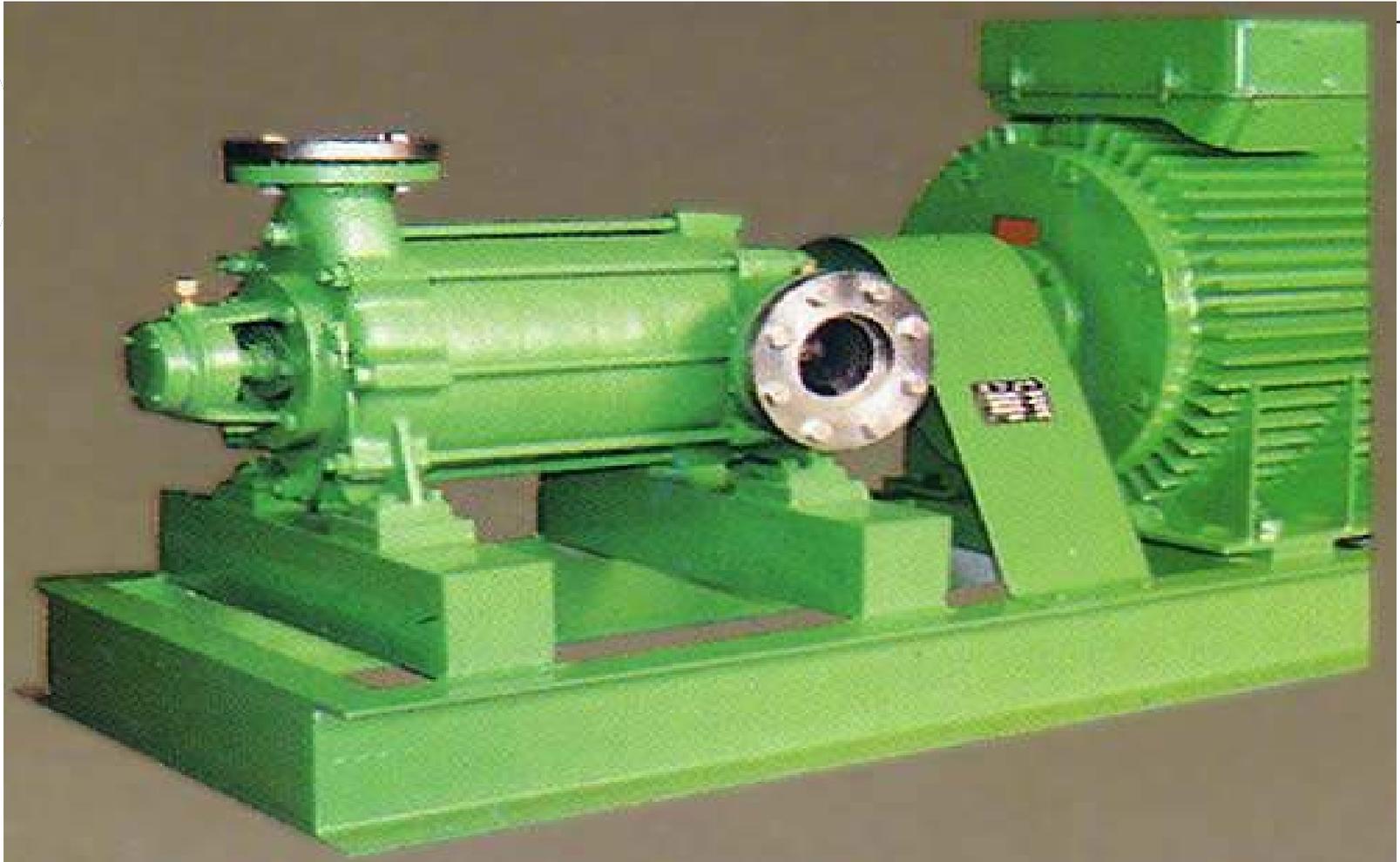


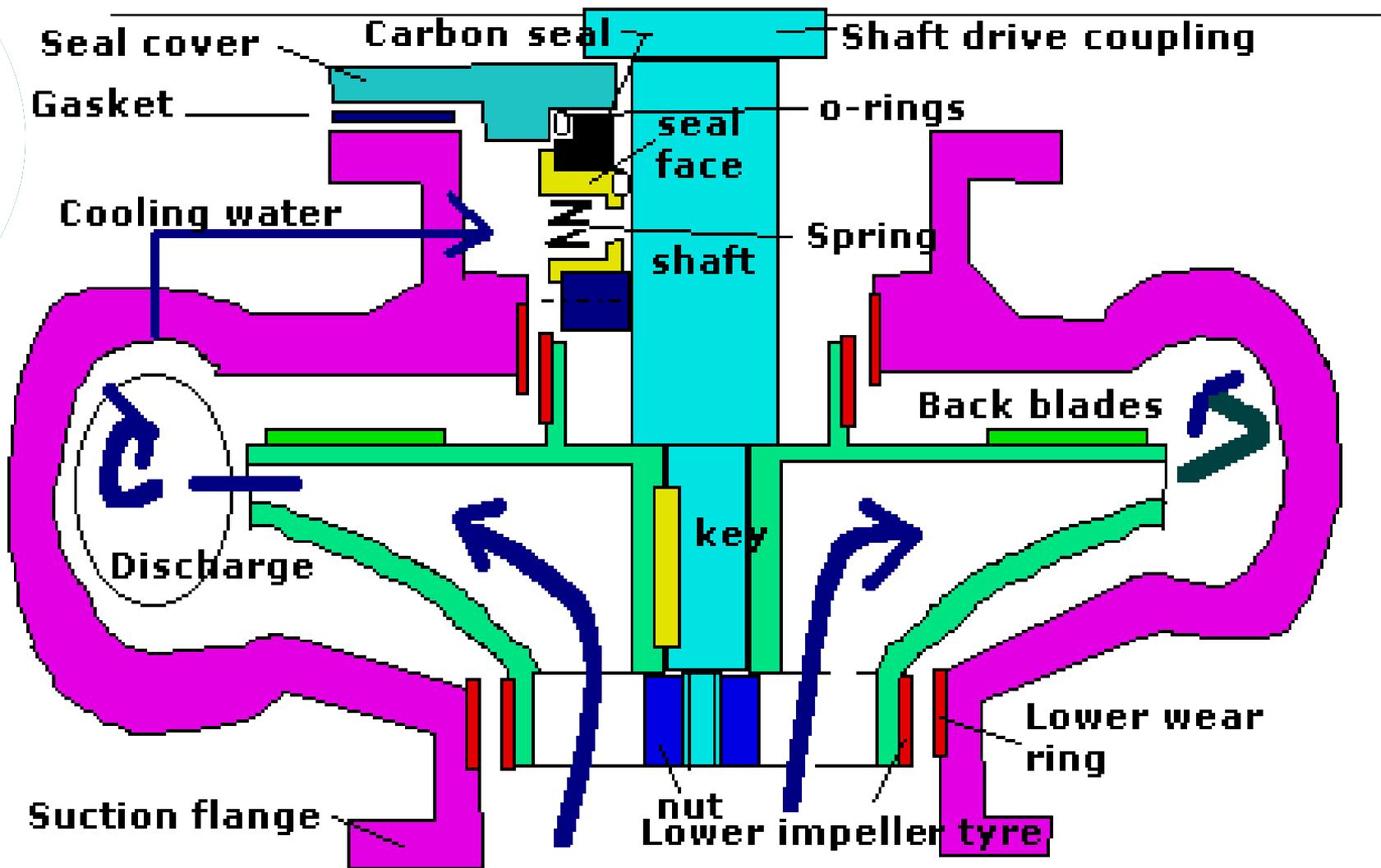
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- The most common type makes use of the ***distillation*** process. Using the heat from the engines, the sea water is ***evaporated*** under low atmospheric pressure. The vapour is then led into a cooling section and it condenses into water

PUMPS

- 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

- 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

- 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

- 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.

- **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

Condition (v)-To bring into desired condition

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



Evaporate (v)-To change into vapour

Generate (v)-To produce (energy)

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

Write the verb forms.

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?

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



8-Which is not located in the engine room?

e. steering gear



What is used to separate oil from bilge water?

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



What is used to separate oil from bilge water?

c. separator