



# **SNS COLLEGE OF TECHNOLOGY**

## **AN AUTONOMOUS INSTITUTION**



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### **DEPARTMENT OF AGRICULTURAL ENGINEERING**

**COURSE CODE & NAME: 19AGT301 & HEAT POWER ENGINEERING**

**III YEAR / V SEMESTER**

**UNIT : V BOILERS**

**Topic : Classifications of Boilers**



# **STEAM BOILERS, MOUNTINGS & ACCESSORIES**



**The equipment used for producing and transferring steam is called**

***Steam generators/ Boilers.***



# Principle of Steam Generators/ Boilers:

The fluid (water) contained in the boiler called *shell* and the thermal energy released during combustion of fuel, which may be solid, liquid or gaseous, is transferred to water and this converts water into steam at the desired temperature and pressure.



## STEAM BOILERS, MOUNTINGS & ACCESSORIES



### **Commercial usage of Steam:**

- i) Power generation**
- ii) Heating the residential and commercial buildings in cold weather countries.**
- iii) Other industrial usages e.g. sugar industries and chemical industries etc.**



**STEAM BOILERS, MOUNTINGS & ACCESSORIES**



**Classification of**

**Boilers**



## Classification of Boilers:

Boilers may be classified according to the following-

### 1. *Relative position of Hot gases and Water*

#### a) **Fire Tube Boiler:**

The hot gases pass through the tubes that are surrounded by water. Fire tube boilers are also known by certain common names-

- Horizontal return tubular
- Locomotive fire box
- Scotch Marine
- Vertical tubular
- Cochran boiler
- Lancashire boiler



## **b) Water Tube Boiler:**

The water passes through the tubes and the hot gases produced by combustion of fuel, flow outside. This type of Boilers designated by the following common names:

- i) Babcock and Wilcox Boiler (straight but inclined tubes which connect the headers).
- ii) Stirling Boiler (multi tubular boiler having bent tubes that connect boiler drums to headers).





## ***2. Method of firing***

### **a) Internally fired Boilers:**

The furnace is provided *inside* the boiler shell and is completely surrounded by water cooled surfaces. This method of firing is used in:

- Lancashire Boilers (F.T)
- Locomotive Boilers (F.T)
- Scotch Boilers



## **b) Externally fired Boilers:**

The furnace is provided *outside/ under* the boiler. It has an advantage that its furnace is simple to construct and can easily be enlarged, as and when required. This method of firing is used in **Babcock and Wilcox Boiler**.

## **3) Pressure of Steam:**

### **i) High pressure Boilers:**

Boilers producing steam *80 bar* and above are called High pressure boilers. E.g.

- \* Babcock and Wilcox Boiler (W.T)
- \* Lamont Boilers
- \* Velox Boilers and
- \* Benson Boilers etc.



## ii) Low pressure Boilers:

Boilers producing steam Lower than *80 bar* are called Low pressure boilers. E.g.

- Cochran Boilers
- Cornish Boiler
- Lancashire Boiler
- Locomotive Boiler



#### *4. Method of circulation of water:*

a) **Natural circulation method**

Circulation set up by convection current or by gravity.

b) **Forced circulation method**

Circulation set up for high pressure steam through pumps.



## ***5. Nature of service to be performed:***

### **a) Land Boilers:**

Boilers which are used with stationary plants

### **b) Portable Boilers:**

Boilers which can be readily dismantled and easily carried out from one site to another.

### **c) Mobile Boilers:**

Boilers which are fitted on mobile carriages are called Mobile Boilers. E.g. marine and locomotive boilers.



***6. Once through Boilers:***

The boilers in which no circulation of water takes place i.e. the feed water leaves the tube as steam e.g. Benson Boilers.

***7. Position and No. of Drums:***

Single or multi drums may be positioned longitudinally or crosswise.

***8. Design of gas passages:***

- a) Single pass
- b) Return pass
- c) Multi pass



## ***9. Nature of Draught:***

### **a) Natural Draught:**

when the fuel burns in the furnace of the boiler, with the circulation of air, the draught is named as Natural Draught.

### **b) Artificial Draught:**

When the air is forced by means of forced fan, the draught is named as Artificial Draught.



***10. Heat Source:***

- a) Combustion of solid, liquid or gaseous fuel.
- b) Electrical and nuclear energy.
- c) Hot waste gases of other chemical reactions.

***11. Fluid Used:***

- a) Steam Boilers- use water as a fluid.
- b) Mercury Boilers- use mercury as a fluid.
- c) Other Boilers- use special chemicals as a fluid.





***12. Material of construction of Boiler Shell:***

- a) **Cast Iron Boilers:** Low pressure heating Boilers.
- b) **Steel Boilers:** Low pressure heating Boilers.
- c) **Copper and Stainless steel Boilers:** Miniature Boilers.



*Thank You*