SNS COLLEGE OF TECHNOLOGY

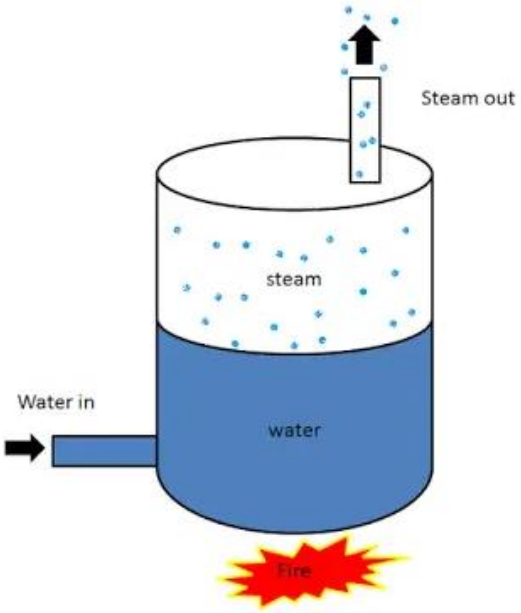
DEPARTMENT OF MECHANICAL ENGINEERING

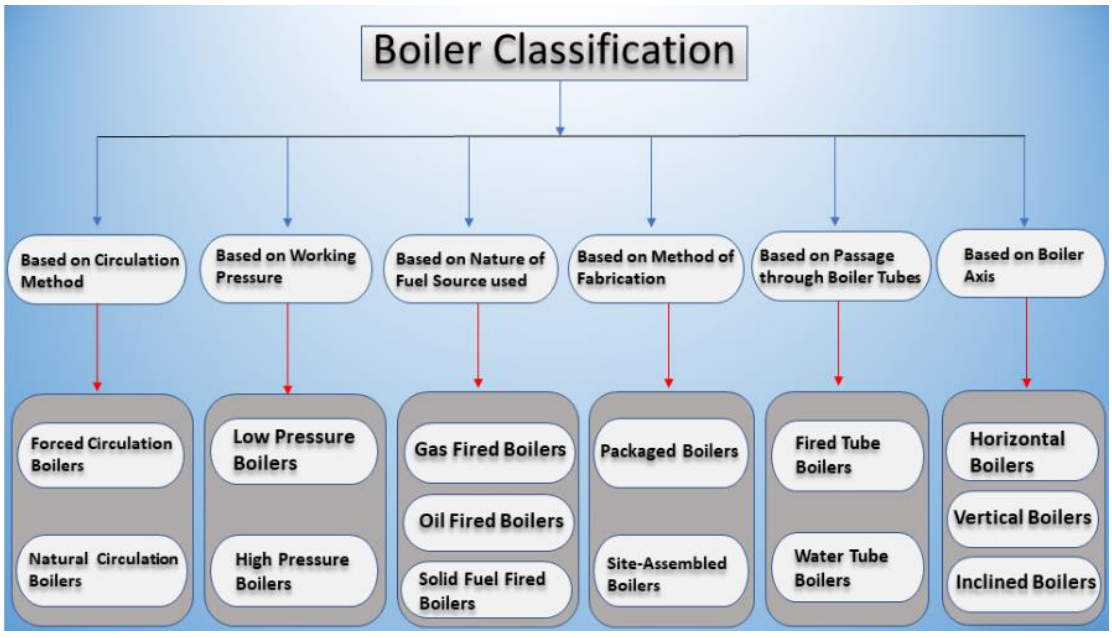
19MEB203 -THERMAL ENGINEERING

UNIT 3-Steam Boilers,Nozzles & Turbines

Boilers-Types and Comparison

A boiler is a closed vessel which is used to convert the water into high pressure steam. The high pressure steam so generated is used to generate power and other applications





Different Types of Boiler

Boilers can be classified on a different basis but here I am discussing the only important basis of boiler classification.

1. According to the Contents in the Tubes

According to the contents in the tubes, the boilers can be classified as fire tube boiler and water tube boiler.

(i) Fire Tube Boiler:

In a fire tube boiler the fire or hot gas is present inside the tubes and water surrounds these fire tubes. Since fire is inside the tubes and hence it is named as fire tube boiler. The heat from the hot gases is conducted through the walls of the tube to the water.

The examples of the fire tube boiler are: simple vertical boiler, Cochran boiler, Lancashire boiler, Cornish boiler, Locomotive boiler, Scotch marine boiler and Velcon boiler.

(ii). Water Tube Boiler:

In water tube boilers, the water is present inside the tubes and the fire or hot gases surrounds these water tubes.

Examples of water tube boilers are La-Mont boiler, Benson boiler, Stirling boiler, Babcock and Wilcox boiler, Yarrow boiler and Loeffler boiler.

2. According to the Number of Tubes

According to the no of tubes, the boilers are classified as single tube boiler and multitubular boilers.

(i). Single Tube Boilers:

The boilers which contain one fire tube or water tube are called a single tube boiler.

The examples of single tube boilers are Cornish boiler and simple vertical boiler.

(ii). Multitubular Boiler:

The boilers which has two or more water tube or fire tubes are called multi-tubular boilers.

Lancashire boiler, Locomotive boiler, Cochran boiler, Babcock and Wilcox boilers are multitubular boilers.

3. According to the Position of the Furnace

According to the position of the furnace, the steam boilers are classified as internally fired boilers and externally fired boilers.

(i). Internally Fired Boilers:

The boilers in which the furnace is located inside the boiler shell are called internally fired boilers.Among all the fire tube boilers, most of the boilers are internally fired boilers.

(ii). Externally Fired Boilers:

In externally fired boilers, the furnace is located outside the boiler shell. In this the furnace is arranged underneath in brick work setting.

Water tube boilers are always externally fired boilers.

4. According to the Axis of the Shell

According to the axis of the shell, the boilers are classified as vertical boilers and horizontal boilers.

(i). Vertical Boilers:

The boilers in which the axis of the shell is vertical are called vertical boilers.

Examples of vertical boilers are: simple vertical boiler and Cochran boiler.

(ii). Horizontal Boilers:

When the axis of the shell in a boiler is found horizontal than it is called a horizontal boiler.

Lancashire boiler, Babcock and Wilcox boiler, and locomotive boilers are examples of horizontal boilers.

5. According to the Methods of Circulation of Water and Steam

According to the method of circulation of water and steam, the steam boilers are divided into natural circulation boilers and forced circulation boilers.

(i). Natural Circulation Boilers:

In natural circulation boilers, the circulation of water takes place naturally by the convection currents that set ups during the heating of water.

In most of the boilers there is a natural circulation of water such as Lancashire boiler, Cochran boiler etc.

(ii). Forced Circulation Boilers:

In this type of steam boilers, the water circulation takes place with the help of a centrifugal pump driven by some external power. Here the circulation is forced by some external agency.

Forced circulation is used in high pressure boilers such as

La-Mont boiler, Loeffler boiler, Benson boiler etc.

6. According To The Use

According to the use, the boilers are classified as stationary boilers and mobile boilers

(i). Stationary Boilers:

These are the boilers that are stationary and cannot be moved from one place to another. Once they are installed, they cannot be transported to another destination.

These boilers are used in power plants and in industrial process works.

(ii). Mobile Boilers:

These are the steam boilers that can be moved from one place to another.

Locomotive and marine boilers are mobile boilers.