MOUNTINGS

Boiler **mountings** are a set of safety device installed for the safe operation of a boiler. There are seven main **mountings** on a boiler shell; safety valve, steam stop valve, vent valve, pressure gauge, water level indicator, feed check valve and fusible plug.

ACCESSORIES

The following are the important **accessories** of the **boiler** are: Feed water pump Injector Pressure reducing valve Economiser Air pre heater Super heater Steam drier or separator Steam trap 1. Feed water pump: the feed water pump is used to feed water to the **boiler**.

Boiler Mountings

1. Water level indicator (Water level gauge)
2. Pressure gauge
3. Safety valves
4. Stop valve
5. Blow off Valve
6. Feed check valve

Boiler Accessories

1. Air pre-heater
2. Superheater
3. Economiser
4. Feed pump

1. Water Level Indicator

It is fitted in front of the boiler and generally present two in number.

It is used to indicate the water level inside the boiler. It shows the instantaneous level of water that is present inside the steam boiler which is necessary for its proper working.

2. Pressure gauge

It is also present in front of the boiler.

It is used to measure the pressure of the steam inside the boiler.

The pressure gauges generally used are of Bourden type

3. Safety Valves

Safety valves are attached to the steam boiler chest.

It is used to prevent explosion due to excessive internal pressure. When the internal pressure inside the boiler exceeds its working pressures than the safety valves blow off the steam and maintains the internal pressure.

Generally two safety valves are present on a boiler.

4. Stop Valve (steam stop valve)

It is usually fitted on the highest part of the boiler with the help of a flange.

The main function of the stop valve is

To control the flow of steam from the boiler to the main steam pipe.

To completely shut off the steam supply when required.

5. Blow Off Valve

It is fitted at the bottom of the boiler drum.

The functions of blow-off Valve is

To empty the boiler whenever required.

To discharge the scale, mud and sediments which gets collected at the bottom of the boiler.

Boiler accessories: the boiler accessories are the integral parts of the boiler. They are used in the boiler to improve its efficiency.

1. Air preheater

It is used to recover heat from the exhaust gases.

It is installed between the economiser and the chimney.

2. Superheater

It is placed in the path of hot flue gases from the furnace.

A superheater is an important accessory used in the boiler. Its main function is to increase the temperature of saturated steam without raising its pressure.

3. Economiser

It is used to heat the feedwater by the utilization of heat from the hot fuel gases before it leaves the chimney.

A economiser improves the economy of the steam boilers.

4. Feed pump :it is used to deliver water to the boiler.

Boilers Classification:

There are a large number of boiler designs, but boilers can be classified according to the following criteria:

1. According to Relative Passage of water and hot gases:

Water Tube Boiler: A boiler in which the water flows through some small tubes which are surrounded by hot combustion gases, e.g., Babcock and Wilcox, Stirling, Benson boilers, etc.

Fire-tube Boiler: The hot combustion gases pass through the boiler tubes, which are surrounded by water, e.g., Lancashire, Cochran, locomotive boilers, etc.

2. According to Water Circulation Arrangement:

Natural Circulation: Water circulates in the boiler due to density difference of hot and water, e.g., Babcock and Wilcox boilers, Lancashire boilers, Cochran, locomotive boilers, etc.

Forced Circulation: A water pump forces the water along its path, therefore, the steam generation rate increases, Eg: Benson, La Mont, Velox boilers, etc.

3. According to the Use:

Stationary Boiler: These boilers are used for power plants or processes steam in plants.

Portable Boiler: These are small units of mobile and are used for temporary uses at the sites.

4. According to Position of the Boilers:
Horizontal, inclined or vertical boilers
5. According to the Position of Furnace
Internally fired: The furnace is located inside the shell, e.g., Cochran, Lancashire boilers, etc.
Externally fired: The furnace is located outside the boiler shell, e.g., Babcock and Wilcox, Stirling boilers, etc.
6. According to Pressure of steam generated
Low-pressure boiler: a boiler which produces steam at a pressure of 15-20 bar is called a low-pressure boiler. This steam is used for process heating.
Medium-pressure boiler: It has a working pressure of steam from 20 bars to 80 bars and is used for power generation or combined use of power generation and process heating.
High-pressure boiler: It produces steam at a pressure of more than 80 bars.
Sub-critical boiler: If a boiler produces steam at a pressure which is less than the critical pressure, it is called as a subcritical boil**Supercritical boiler:** These boilers provide steam at a pressure greater than the critical pressure. These boilers do not have an evaporator and the water directly flashes into steam, and thus they are called once through boilers.
7. According to charge in the furnace.
Pulverized fuel,
Supercharged fuel and
Fluidized bed combustion boilers.
er.

Working Principle of **Boiler**

The **boiler** is essentially a closed vessel inside which water is stored. ... These hot gasses come in contact with water vessel where the heat of these hot gases transfer to the water and consequently steam is produced in the **boiler**. Then this steam is piped to the turbine of thermal power plant.

Steam Boiler Efficiency

The percentage of total heat exported by outlet steam in the total heat supplied by the fuel (coal) is called **steam boiler efficiency**.

It includes with thermal efficiency, combustion efficiency and fuel to steam efficiency. **Steam boiler efficiency** depends upon the size of boiler used. A typical efficiency of steam boiler is 80% to 88%. Actually there are some losses occur like incomplete combustion, radiating loss occurs from **steam boiler** surrounding wall, defective combustion gas etc. Hence, efficiency of steam boiler gives this result.

Boilers efficiency and performance

- **Introduction of Boiler Efficiency**
- It is a recognized truth that the original cost of the boiler is a small part of the total costs associated with the boiler over its existence. In the **working life of a boiler**, the major price comes out of the fuel costs. This is why making sure theeffective operation of the boiler is crucial to optimize the fuel costs.
- It is a myth that a boiler will always operate at its estimated efficiency. Almost all the times, it has been discovered that the boilers run at much lower than the measured efficiencies if proper **efficiency** monitoring is not done.
- The goal of the performance test is to define the actual production and efficiency of the boiler and compare it with design preferences or norms. It is a symbol for tracking day-to-day and season-to-season changes in **boiler efficiency** and power efficiency enhancements.
- Boiler Efficiency Definition
- According to Wikipedia*" **Boiler Efficiency** is a relationship between **energy supplied** to the **boiler** and **energy output** received from the boiler."*
- PERFORMANCE:If a boiler has good combustion system, which converted the fuel energy into thermal energy more thermal energy will be produced from the available fuel energy. If the boiler's heat transfer system is efficient, a maximum portion of generated heat will be absorbed by water during the generation of steam.
- The performance of boiler can be assessed by the following proceduressss.
- **Performance assessment**
- The efficiency of boiler is found out by calculating fuel energy input to the thermal energy available in the form of steam. Fuel energy can be calculated by knowing the calorific value of fuel used in the boiler. The thermal energy used for the production of steam can be calculated from the enthalpy of the steam based on the initial and final temperatures.