

- b. Efficiency is much greater than the chimney and Natural draught.
- c. inferior quality of fuel can be economically burnt.
- d. It is possible to regulate it Acc. to requirement of surface.

3. Steam Jet draught: The simple and easy way of producing Artificial draught is by steam jet. It is of two types:

- forced draught: In forced draught steam from boiler having been throttled to a press. of 1.5 to 2 bar.
- In induced draught: The jet of exhaust steam is directed into the smoke box.

Advantages: It is quite simple and cheap, it has the capability of using low grade fuels, it occupies very little space.

4. Mechanical draught: The draught produced by fans and blowers is known as mechanical draught. It has two types.

- Induced draught: In this system the fan is placed near or at the base of the chimney. This type of draught is usually used when economiser and pre-heater are incorporated.
- forced draught: In this system a fan or blower is installed near or at the base of the boiler grate to deliver air to the furnace under pressure varying from 2.5 cm to about 7.5 cm of water.

Q. Explain various heat losses in a boiler and prepare heat balance sheet?

Ans. Heat losses in a boiler: The efficiency of a boiler is never 100% as only a portion of heat supplied by fuel is usually utilized and rest of it is lost in the following.

- Heat carried away by dry products of combustion.
- Heat carried away by the steam produced by the combustion of hydrogen present in the fuel.
- Heat lost due to incomplete combustion of carbon to carbon monoxide instead of carbon dioxide and they escape of the combustible matter in the flue gases and ash.
- Heat carried away by moisture in fuel and air.
- Heat loss due to radiations.

The efficiency of a boiler can be improved by utilizing the heat of flue gases in Superheater, Economiser and air preheater.

Heat Balance Sheet of a boiler:



# Heat Balance Sheet Per Kg of coal fired.

3

Heat supplied (KJ)	%	Heat expenditure (KJ)	%
Gross heat supplied.		a.) Heat utilized in steam Engine b.) Heat carried away by fly Gases. c.) Heat utilized in evaporating and super heating the moisture in fuel and water vapour formed due to burning of hydrogen. d.) Heat lost due to incomplete combustion --- e.) Heat carried away by excess air --- f.) Heat carried away by Carbon in Ash --- g.) Heat unaccounted for such as radiation and error etc.	
Total.	100	Total	100

Q4: what are boiler accessories and mountings?

Ans: Boiler mountings: - Boiler mountings are those fittings which are primarily intended for the safety of boiler and for complete control of the process of steam generation.

1. Two water level indicator
2. Fusible plug.
3. Steam stop valve
4. Feed check valve
5. Blow off cock
6. Two safety valve
7. Pressure Gauge
8. man and mud hole.

Boiler Accessories: -

These are the appliances which are installed to increase the efficiency of the steam power plant and to help in the proper working of boiler unit.

1. Feed Pump.
2. Steam injector.
3. Economiser and feed heaters.
4. Super heater.
5. Air preheater.

Q5: what do you understand by efficiency of a boiler and equivalent evaporation?

Ans: Factor of Evaporation: It is the quantity which when multiplied by the amount of steam generated at a given Temp. from water at given temp. gives the equivalent evaporation from and at 100°C.

F = factor of evaporation.

The equivalent evaporation from at 100°C.

$$= \text{actual evaporation} \times F$$

$$= \text{actual evaporation} \times \left( \frac{h - hf_1}{2258} \right)$$

$$F = \frac{h - hf_1}{2258}$$