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Boilers - Classification and selection of boilers

INTRODUCTION

- **Boiler is a closed vessel in which the heat produced by the combustion of fuel is transferred to water for its conversion into steam at the desired temperature and pressure.**

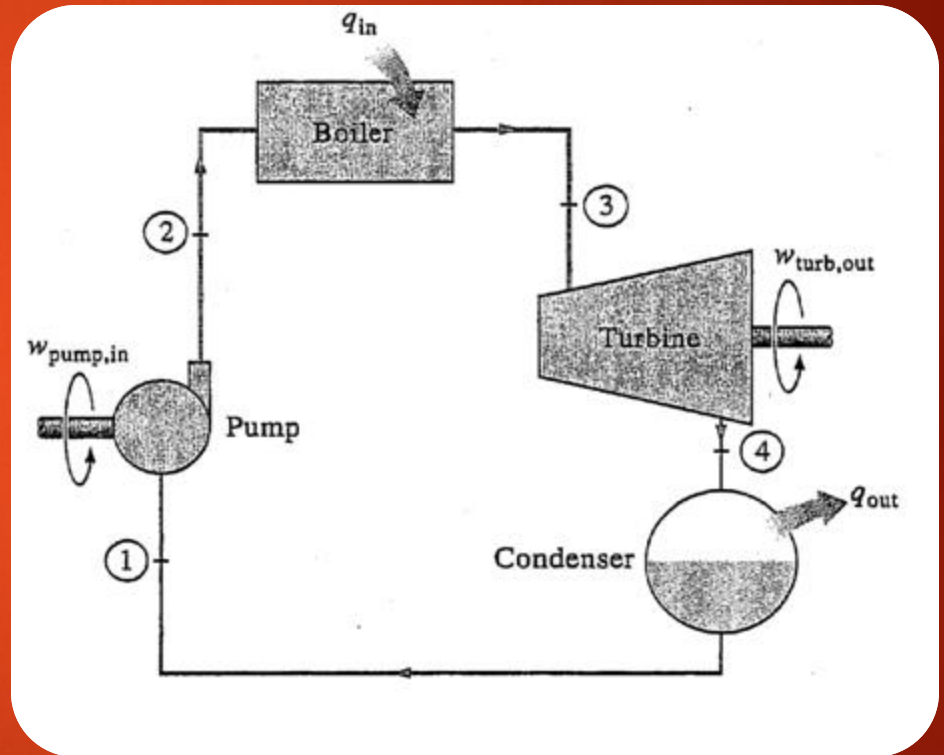
- **Broadly speaking, a boiler is a device used for generating :-**
 - a) **Steam for power generation**
 - b) **Hot water for heating purpose**



STEAM POWER PLANT

mechanical power is produced by a heat engine that transforms thermal energy (from combustion of a fuel) into rotational energy

Heat (generated in the furnace) is transmitted to the boiler where water forced into the boiler by the feed pump is converted into steam



Primary requirements of Boiler

- **The primary requirements of steam generators or boilers are:**
 - a) **The water must be contained safely**
 - b) **The steam must be delivered safely in desired conditions as regards its pressure, temperature, quality and required rate**

Factors Affecting the Choice (selection) of a Boiler

- **The selection of type and size of a steam boiler depends upon the following factors:**
- **The power required and the working pressure**
- **Geographical position of the plant**
- **Availability of fuel**
- **Supply and quality of feed water**
- **The probable load factor**
- **Space available**
- **Labour available**
- **Adaptability to the type of furnace and stoker**
- **Steam pressure and superheat desired**
- **Nature and intensity of draught**

CLASSIFICATION OF BOILERS

The Boilers may be classified as under:

- **Horizontal boiler, vertical or inclined boilers**
- **Fire tube and water tube boilers**
- **Externally fired and internally fired boilers**
- **Forced circulation and natural circulation boilers**
- **High, medium and low pressure boilers**
- **Stationary boiler and portable boiler**
- **Single tube boilers and multi tube boilers**

Boiler Accessories

- **Feed pump**
- **Injector**
- **Economiser**
- **Air pre-heater**
- **Superheater**
- **Steam separator**

Feed pump

➤ **Function:**

Its is a pump which is used to deliver feed water to the boiler.

➤ The appliances in common use for delivering the feed-water into the steam boilers are:

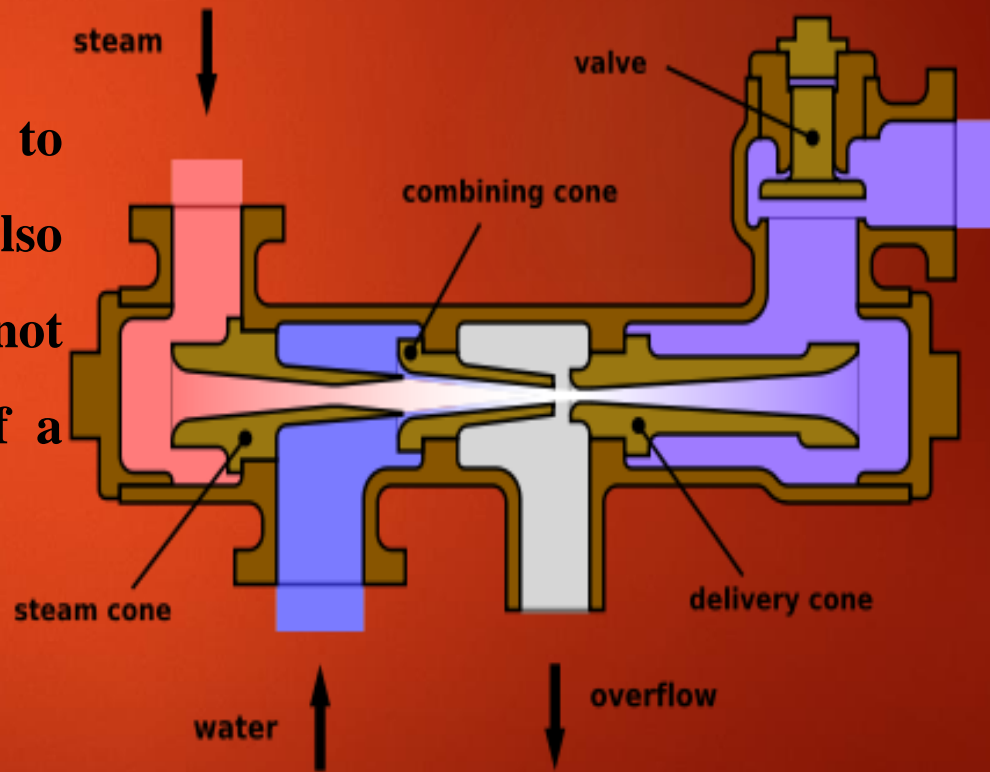
- a) **Reciprocating pump**
- b) **Rotary pump**



Injector

➤ Function:

The function of an injector is to feed water into the boiler. It is also used where the space is not available for the installation of a feed pump



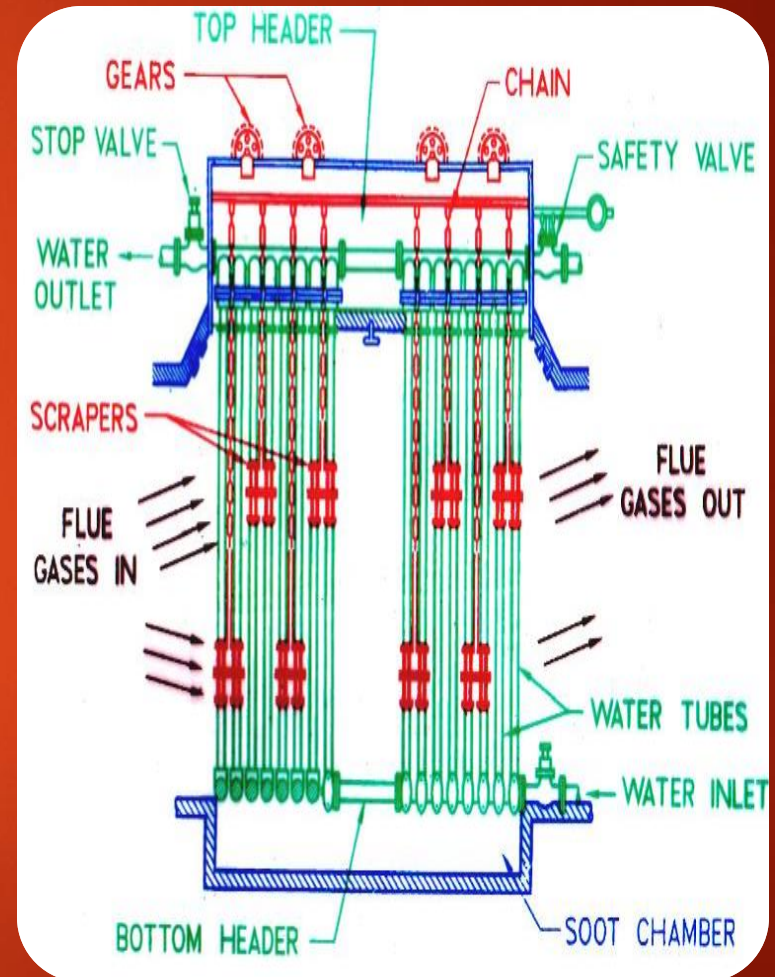
Economiser

➤ Function:

An economiser is a device in which the waste heat of the flue gases is utilised for heating the feed water.

➤ Economiser are of two types :

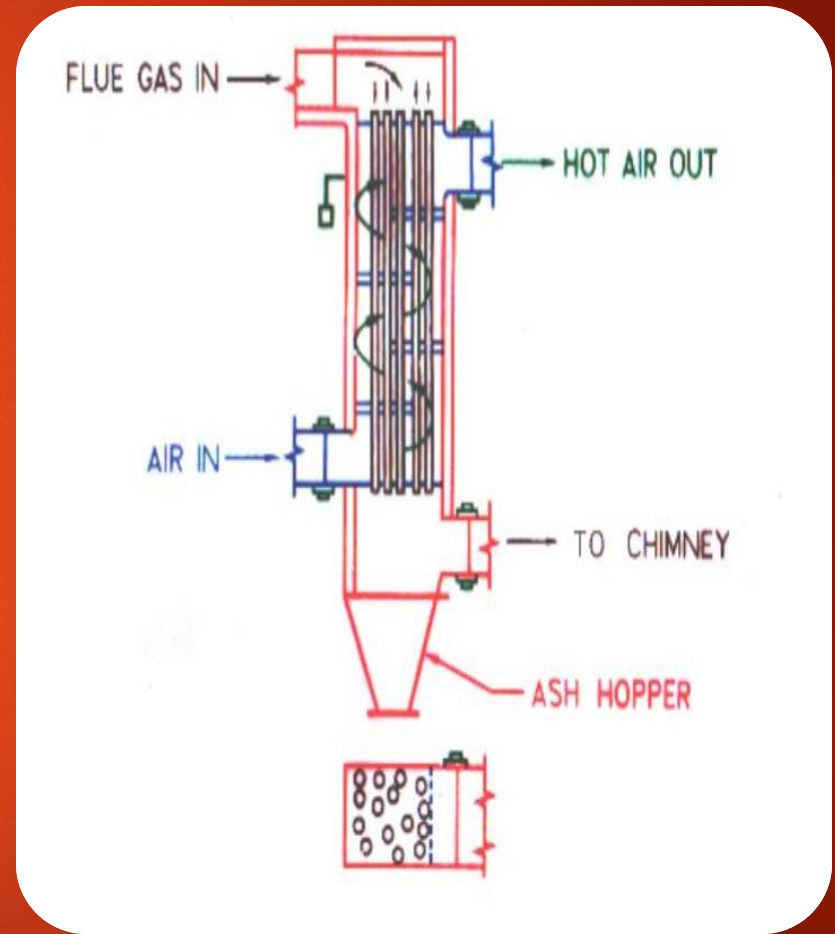
- a) Independent type, and
- b) Integral type



Air prehaeter

➤ Function:

The function of the air pre-heater is to increase the temperature of air before it enters the furnance. It is generally placed after the economiser.



PROBLEM DEFINATION

**More pressure produces in boiler causes
heat loss & fuel loss**

This industry has two types of boiler :

Thermo pack

Steam boiler

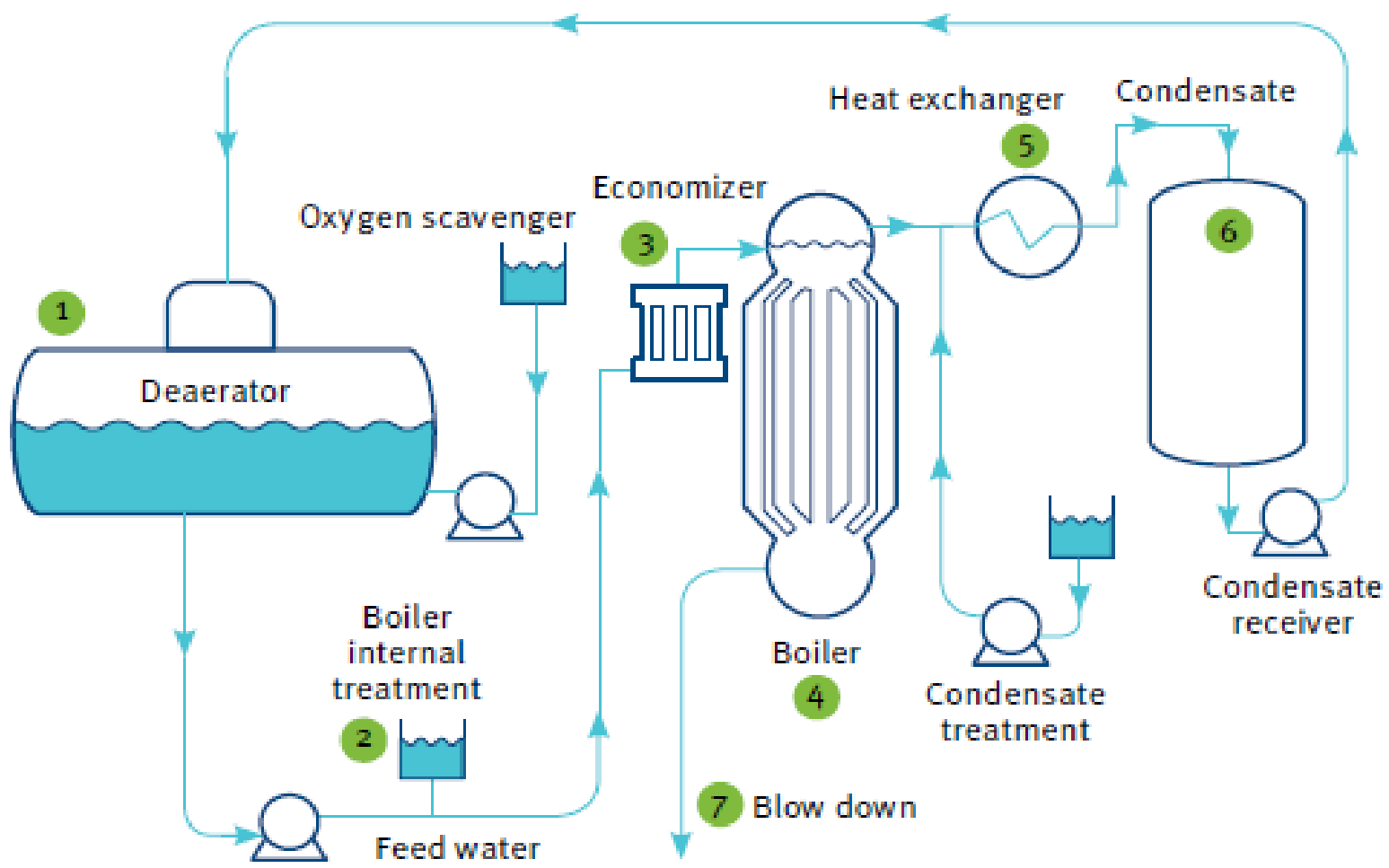
**Thermo pack is oil fired boiler to produce steam from water.
Other boiler produces steam using coal is known as coal fired boiler.**

**KABUTEX PROCESSORS industrial different process
taking place in the industry along with boiler for which we have
defined problem (IDP).**

SOLUTION OF PROBLEM

Reduce the heat loss of boiler:

Boilers are used by many manufacturers to provide steam and hot water for process use via heat exchange, directly into product, or for cleaning purposes. Boilers use large amounts of water and energy so efficient operation can provide significant savings. Often the efficient use of water in boilers leads to a reduction in energy and vice versa. This fact sheet provides a list of opportunities to assist manufacturers in the more efficient operation of boilers.



Feed water is held in the desecrator (1) tank to help remove dissolved oxygen and is then treated (2) prior to entering the boiler (4). There are two types of boilers - water tube and fire tube. Water tube boilers heat water in tubes and the hot combustion gases are contained in the space around the tubes. Fire tube boilers on the other hand have hot combustion gases contained inside tubes and the water is circulated around these. An economizer (3) pre-heats feed water using the flue gases from the boiler's chimney. The water is heated in the boiler (4) to produce hot water and/or steam that can be used directly in the process or sent to a heat-exchanger (5). The heat-exchanger transfers the heat from the circulating boiler water to another media such as the product, as indirect process use. Any condensate (6) (steam that has condensed) is captured and returned to the desecrator for reuse. Because the buildup of contaminants in the circulating water can cause biological growth, corrosion and scale, a portion of the circulating water is blown down (7)

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Thanking you