BOILER

A boiler (or steam generator) is a closed vessel in which water, under pressure , is converted into steam. The heat is transferred to the boiler by all three modes of heat transfer i.e. conduction ,convection and radiation.

Types of boilers

(i) fire tube boiler and (ii) water tube boiler

(iii)Horizontal, vertical or inclined

(iv) Externally fired and internally fired

Boiler Terms

Shell The shell of a boiler consists of one or more steel plates bent into a cylindrical form and riveted or welded together. The shell ends are closed with the end plates.

Setting The primary function of setting is to confine heat to the boiler and form a passage for gases. It is made of brickwork and may form the wall of the furnace and the combustion chamber.

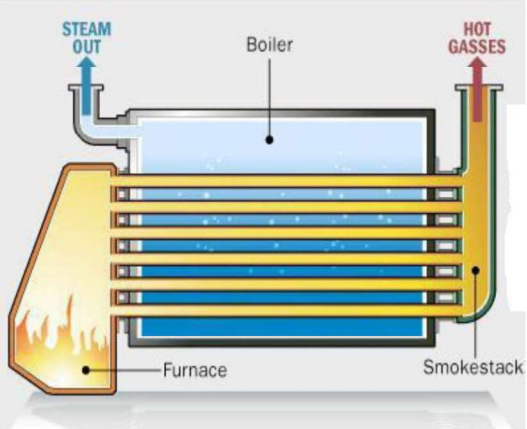
Grate It is the platform in the furnace upon which fuel is burnt and it is made of cast iron bars. The bars are so arranged that air may pass on to the fuel for combustion. The area of the grate on which the fire rests in a coal or wood fired boiler is called grate surface

Mountings The items such as stop valve, safety valves, water level gauges, fusible plug, blow-off cock, pressure gauges, water level indicator etc. are termed as mountings and a boiler cannot work safely without them.

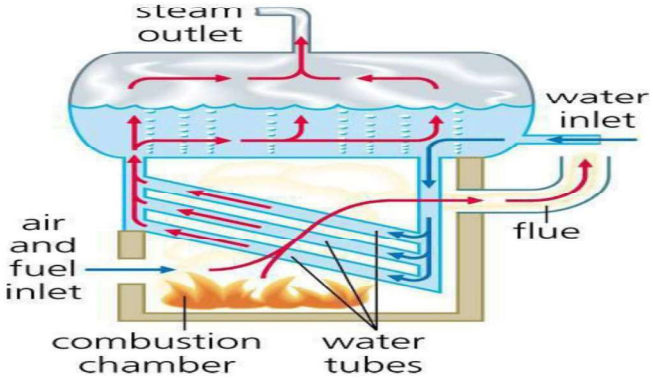
Accessories The items such as super heaters, economisers, feed pumps etc. are termed as accessories and they form integral part of the boiler. They increase the efficiency of the boiler.

Scale A deposit of medium to extreme hardness occurring on water heating surfaces of a boiler because of an undesirable condition in the boiler water.

Blowing off The removal of the mud and other impurities of water from the lowest part of the boiler (where they usually settle) is termed as blowing off .

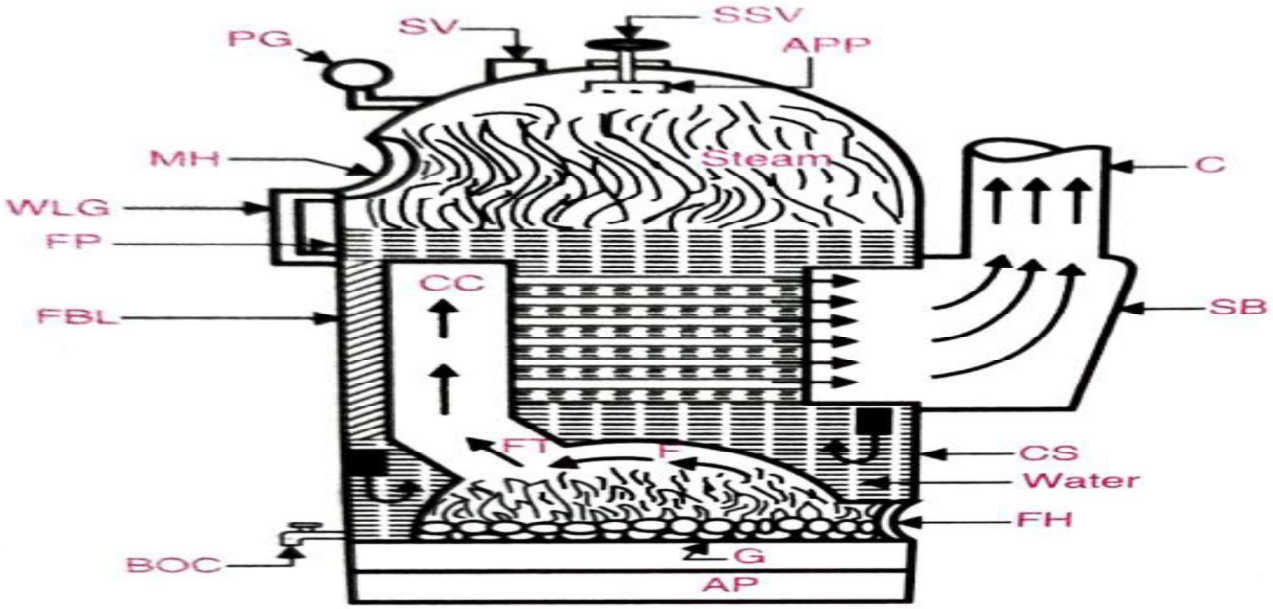


Fire Tube Boiler



Water tube boiler

Cochran boiler

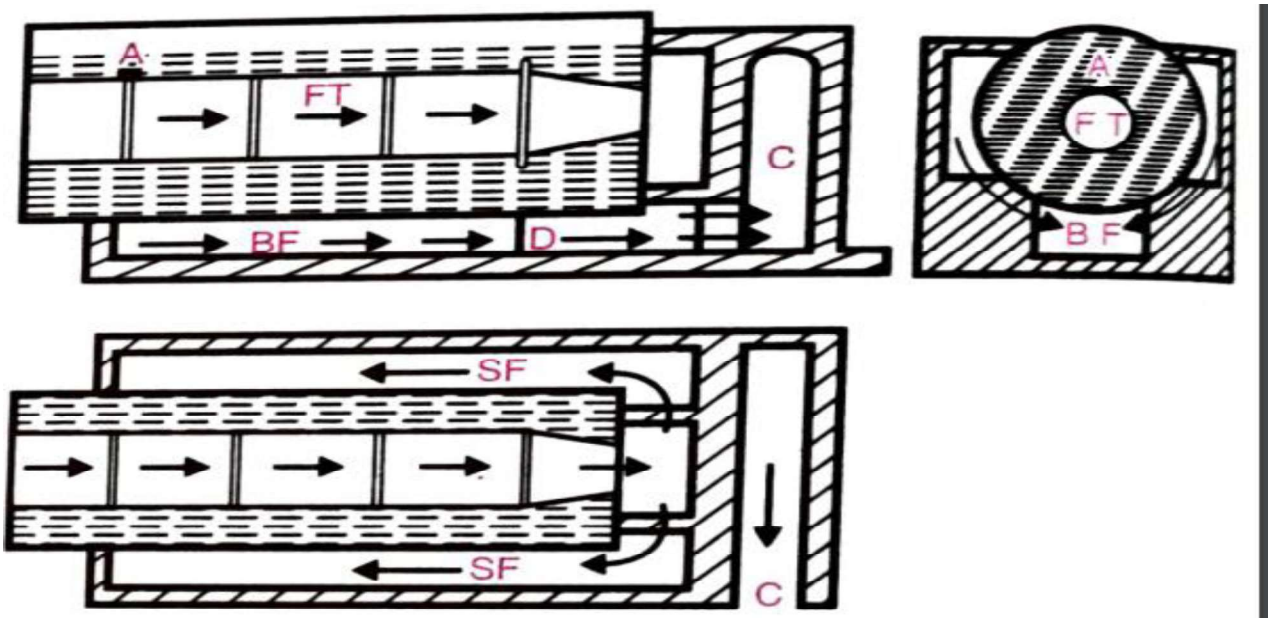


CS = Cylindrical shell
CC = Combustion chamber
FBL = Fir brick lining
F = Furnace (dome shaped)
G = Grate
AP = Ash pit
SV = Safety valve
MH = Man hole
WLG = Water level gauge
FT = Flue tube
SB = Smoke box
C = Chimney
FH = Fire hole
BOC = Blow-off cock
SSV = Steam stop valve
APP = Antipriming pipe
PG = Pressure gauge

Specifications

1	**Shell diameter**	**2.75 m**
2	Height	5.79 m
3	Working pressure	6.5 bar (max. pressure = 15 bar)
4	Steam capacity	3500 kg/h (max. capacity = 4000 kg/h)
5	Efficiency	70 to 75% (depending on the fuel used)

Cornish boiler

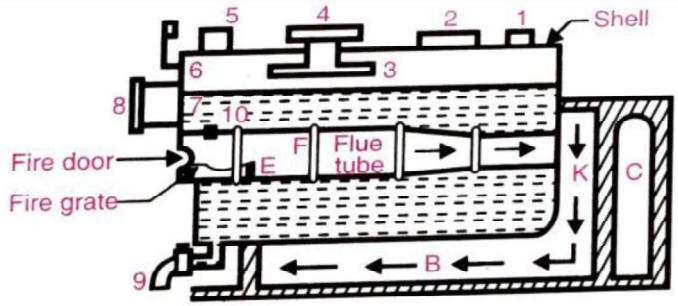


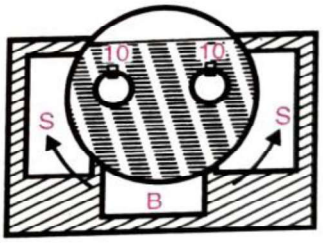
A = Fusible plug
BF = Bottom flue
D = Damper
FT = Flue tube
SF = Side flue
C = Passage to chimney

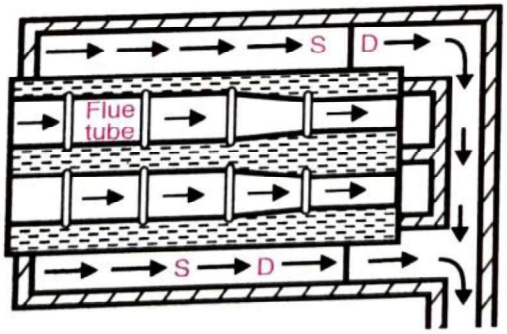
Specifications

1	No. of flue tubes	1
2	Diameter of the shell	1.25 to 1.75 m
3	Length of the shell	4 to 7 m
4	Pressure of the steam	10.5 bar
5	Steam capacity	6500 kg/h

Lancashire boiler







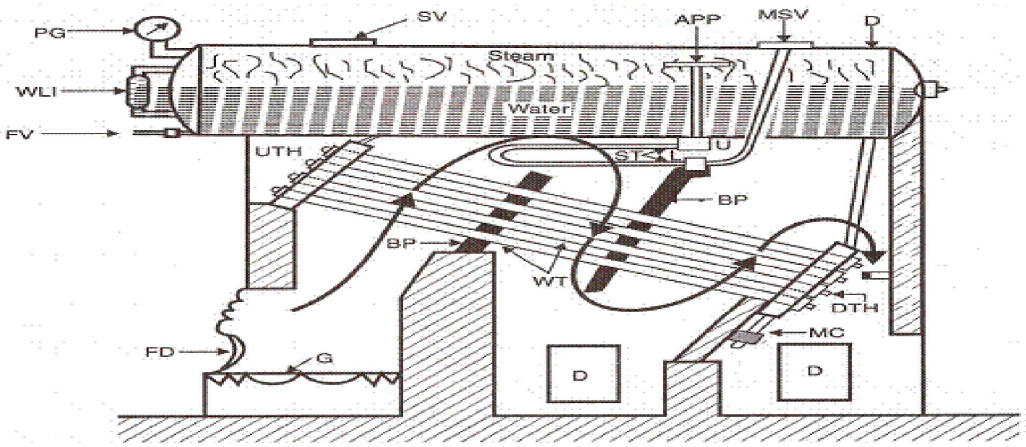
B = Bottom flue
C = Chimney
D = Dampers
E = Fire-bridge
F = Flue tube
K = Main flue
S = Side flue

1. High steam low water safety valve
2. Manhole
3. Antipriming pipe
4. Steam stope valve
5. Safety valve
6. Pressure gauge
7. Feed check valve
8. Water gauge
9. Blow down cock
10. Fusible plug

Specifications

1	Diameter of the shell	2 to 3 m
2	Length of the shell	7 to 9 m
3	Maximum working pressure	16 bar
4	Steam capacity	9000 kg/h
5	Efficiency	50 to 70%

Babcock and wilcox water tube boiler



D = Drum
DTH = Down take header
WT = Water tubes
BP = Baffle plates
D = Doors
G = Grate
FD = Fire door
MC = Mud collector
WLI = Water level indicator

PG = Pressure gauge
ST = Superheater tubes
SV = Safety valve
MSV = Main stop valve
APP = Antipriming pipe
L = Lower junction box
U = Upper junction box
FV = Feed valve

Specifications

1	Diameter of the drum	2 to 1.83 m
2	Length	6.096 to 9.144 m
3	Size of the water tubes	7.62 to 10.16 cm
4	Size of superheater tubes	3.84 to 5.71 cm
5	Efficiency	50 to 70%
6	Working pressure	40 bar (max.)
7	Steaming capacity	40000 kg/h (max.)
8	Efficiency	60 to 80%