



SNS COLLEGE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION



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DEPARTMENT OF AGRICULTURAL ENGINEERING

COURSE CODE & NAME: 19AGT301 & HEAT POWER ENGINEERING

III YEAR / V SEMESTER

UNIT : V BOILERS

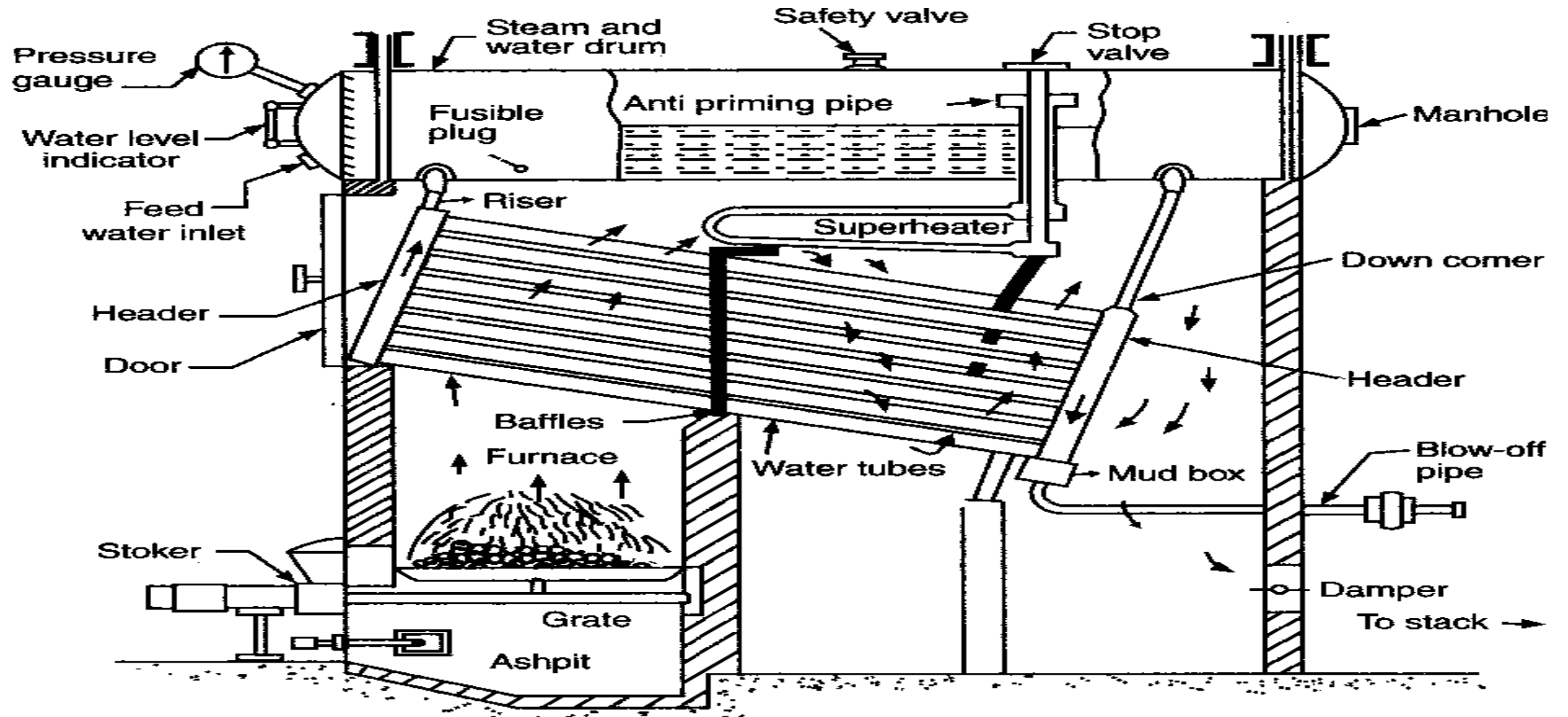
Topic : Water Tube Boilers



WATER TUBE BOILERS



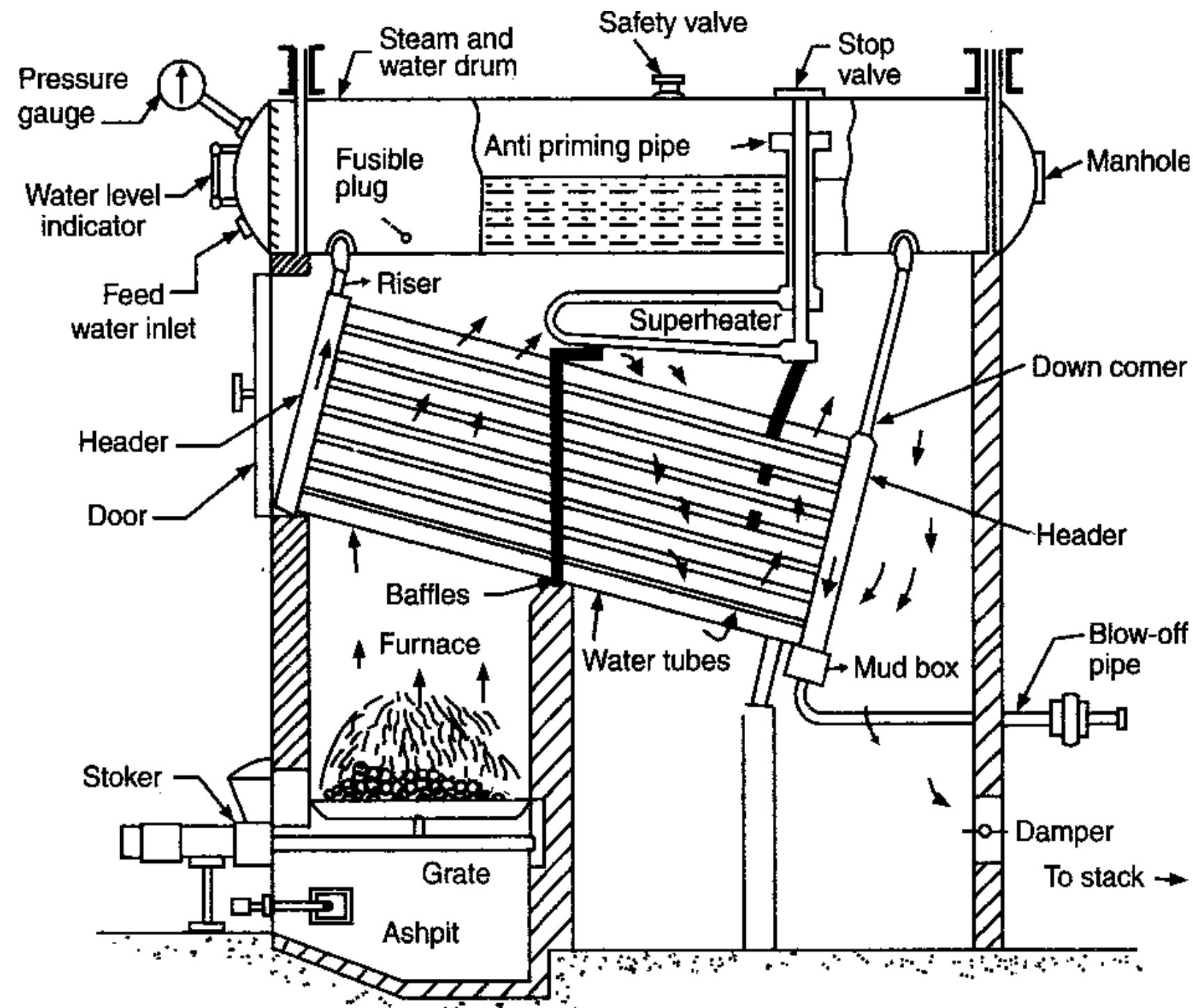
BABCOCK & WILCOX BOILERS





BABCOCK & WILCOX BOILERS

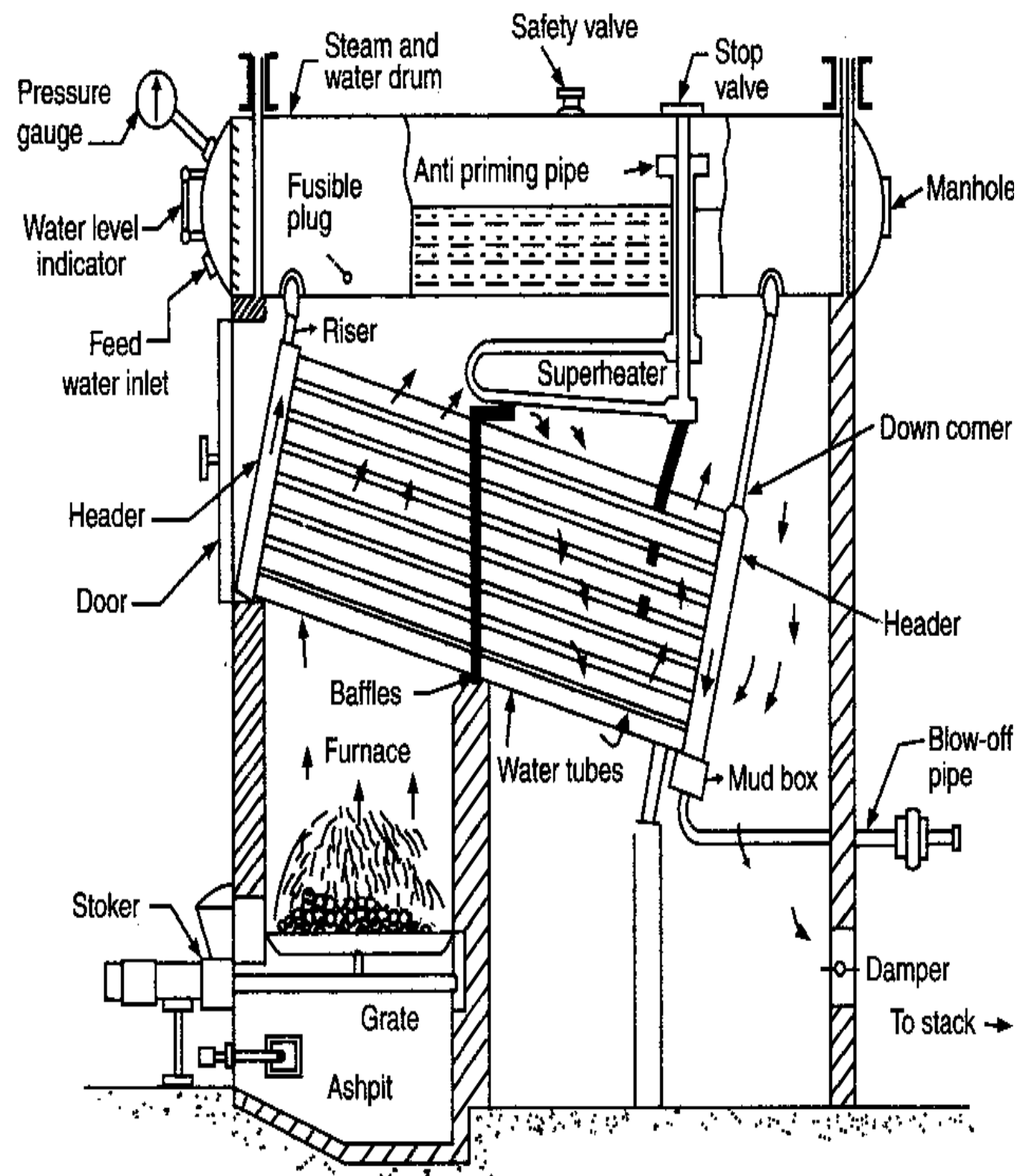
(Constructional features)



- ❖ It consists of welded steel high pressure drum mounted at the top.
- ❖ Drum is connected with uptake header and down take header.
- ❖ Water tubes connected to the headers are inclined at 15° to the horizontal.
- ❖ Water tubes are straight and 10cm diameter expanded into the bored holes of header.
- ❖ Serpentine from of header provides complete heating surface to the flue gases.
- ❖ Furnace is arranged below the uptake header.



BABCOCK & WILCOX BOILERS (Constructional features)



- ❖ Unit is provided with chain grate stoker.
- ❖ Speed of chain is adjusted with respect to the complete combustion of coal.
- ❖ Deflectors to flue gases are provided in the form of baffles.
- ❖ Mud Box: To collect the sedimentation in water.
- ❖ Super heater tubes: To enhance the super heated steam.
- ❖ Vents provided: safety valve, pressure gauge, water level indicator, fusible plug and feed check valve.
- ❖ Water tube and drum assembly hung on steel girder frame called slings.



BABCOCK & WILCOX BOILERS (Capacity and utility)



- Evaporative capacity ranges from 20000 to 40000 kg/hr
- Operative pressure ranges from 11.5 to 17.5 bar.
- Steam formed from such boilers are primarily used to run steam turbines and generate electric power.



BABCOCK & WILCOX BOILERS (Salient Aspects)



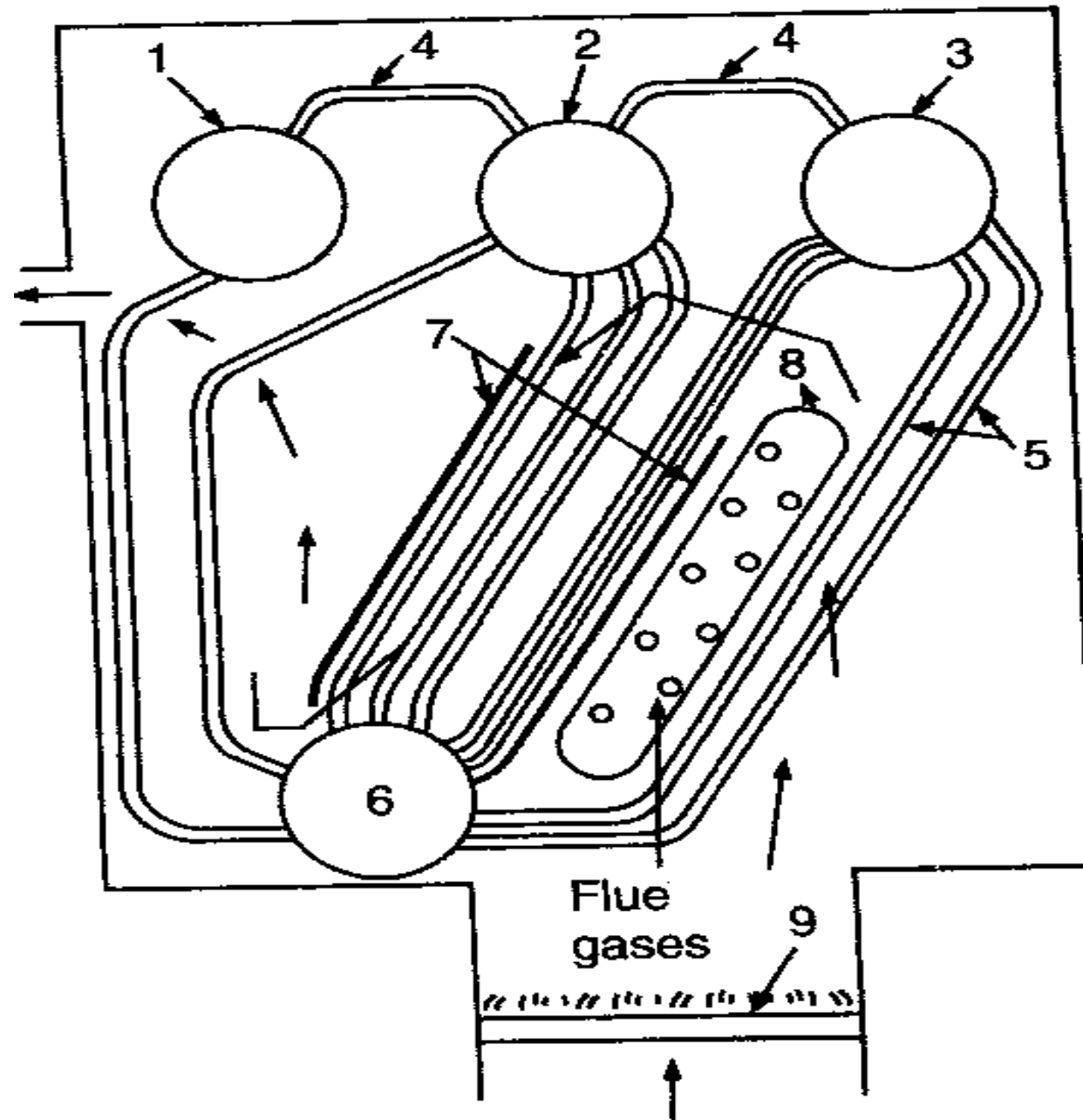
- ✓ Capability to cope with high peak loads which are generally needed in thermal power stations.
- ✓ Inspection of the boiler can be carried even when the boiler is in operation.
- ✓ Draught loss is minimum.
- ✓ Replacement of defective tubes can be made easily.



STIRLING BENT-TUBE BOILER



STIRLING BENT-TUBE BOILER



1. 2 and 3 drums
2. Equalising tubes
3. Water tubes
4. Mud drum
5. Baffles
6. Superheater
7. Fire grate
8. Flue gases
- 9.

1. Drums are interlinked to each other with bent water tubes for the following reasons:
 - a) To allow free expansion and contraction of the tubes.
 - b) Tube replacement become easier.
 - c) Flexibility in design with regards to location of drums.
 - d) Tubes can enter the drums in approximately radial direction.
2. Mud drum is usually 10 to 25cm larger in diameter than a steam drum.
3. Entire unit is independent of brick work.
4. High steam pressures (60bar and 450⁰c).
5. Evaporation capacity up to 50000kg/hr.

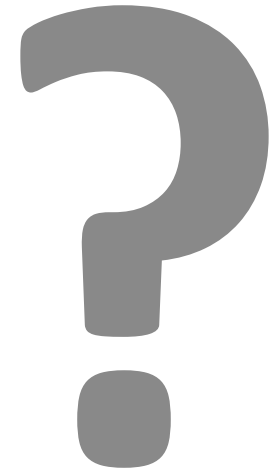


COMPARISON Between WATER TUBE & FIRE TUBE BOILERS

WATER TUBE	FIRE TUBE
Water passes through water tubes.	Hot gases passes through flues.
Water content: steam capacity low (high speed)	Water content: Steam capacity high (Slow speed)
Complexity in design requires quick examination by skilled hands.	Simple & rigid construction hence greater reliability & low operating cost.
Operating pressure up to 200 bar.	Pressure ranges from 17.5 bar to 24.5 bar
Evaporation rate ranges from 20,000 to 50,000kg/hr.	Evaporation rate 900kg/hr.
Increased heating surface area.	Low heating surface area.
Low water to steam ratio	Large water to steam ratio
Bigger in size, suitable for large power plants	Smaller in size, used only for small power plants
Transportation and installation is easy due to handling of dismantled parts	Transportation and installation is difficult due to large size of shell.
Externally fired boilers, furnace size can be varied.	Internally fired boilers, furnace size can not be varied.
Requires more floor area	Requires less floor area



ESSENTIALS OF A GOOD BOILER





1. Heat generation capability should be at:

- a) Required pressure
- b) Required quality
- c) Fast speed
- d) Minimum fuel consumption

2. Economic :

- a) Low initial cost
- b) Low installation cost
- c) Low operating cost
- d) Low maintenance cost



3. Construction:

- a) Light in weight
- b) Less amount of brick work
- c) Occupy small floor area

4.Quick starting.

5.Capable to meet fluctuating demand of steam supply.

6. Easy availability of spare parts



Thank You