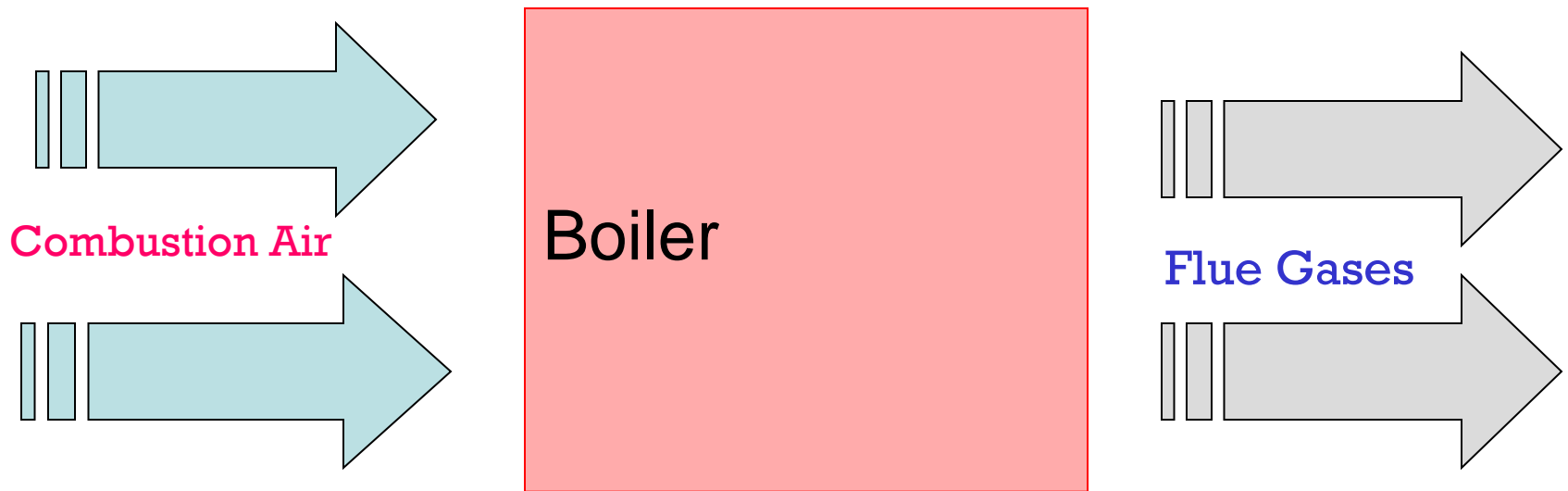


Air & Draft System

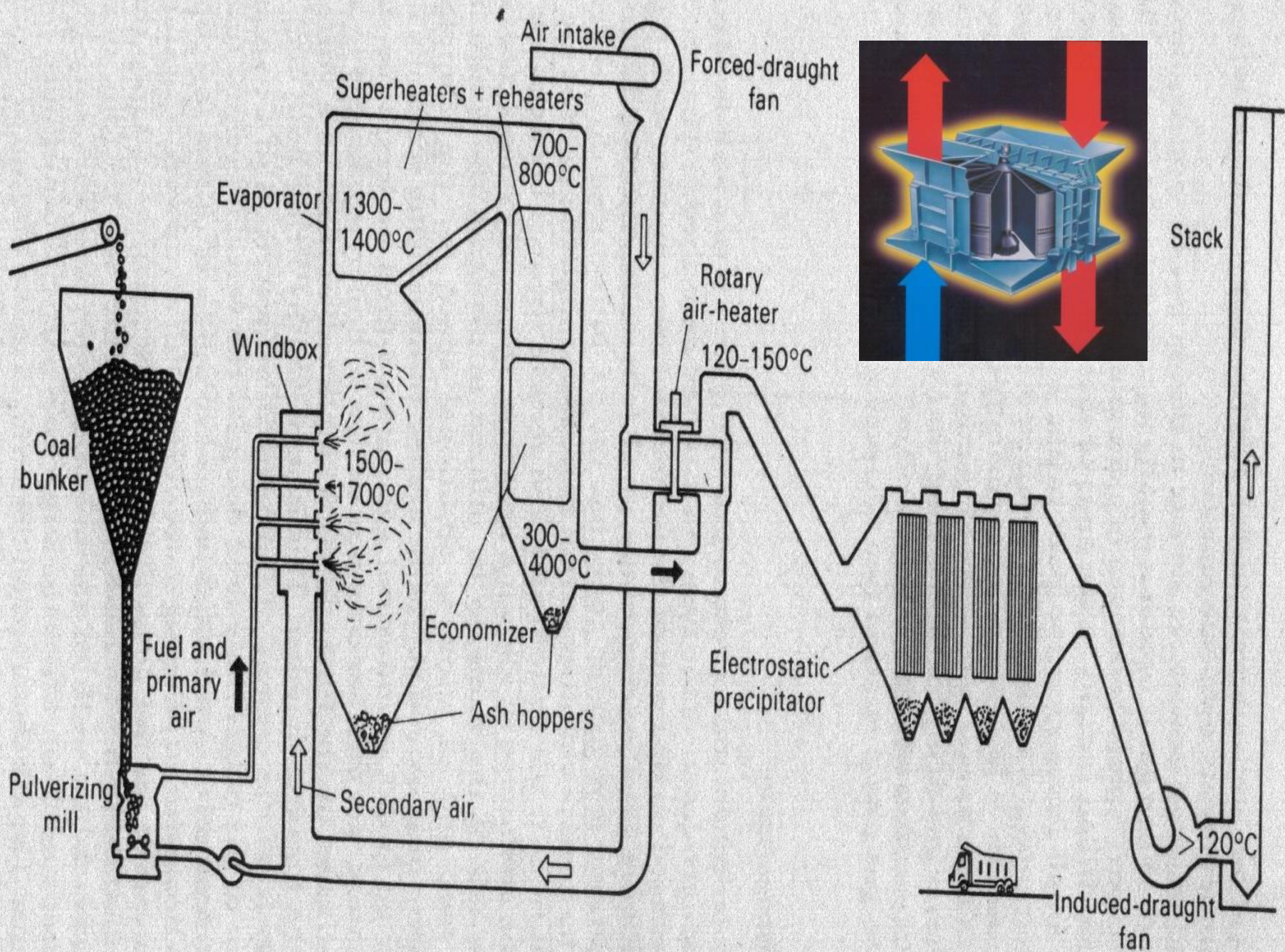
CONTENTS:

- **Various auxiliary equipment in a boiler**
- **Need for Draft System**
- **Primary and secondary air system in Boiler and their fans**
- **Other fans in a boiler**

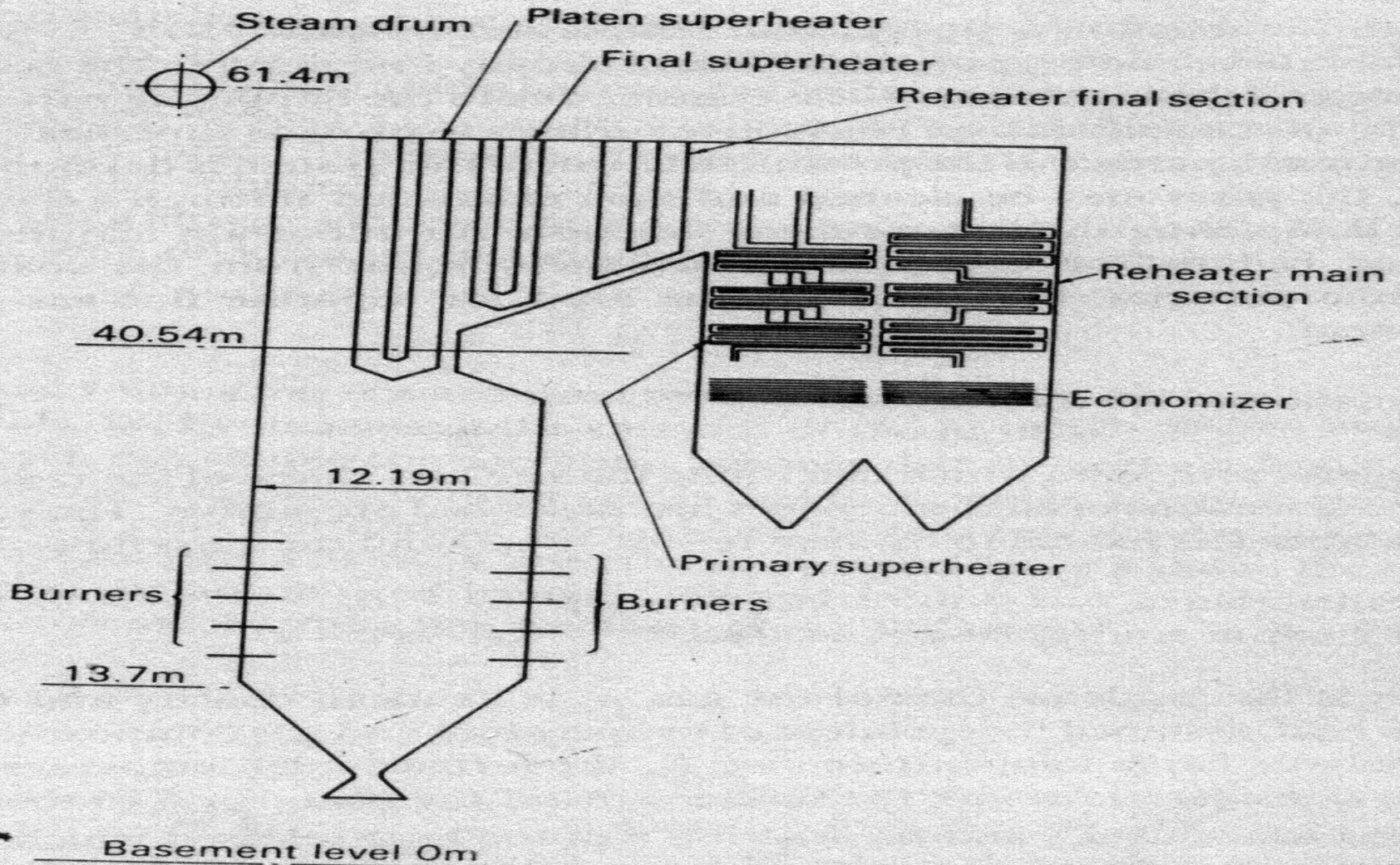
Need of Draft System

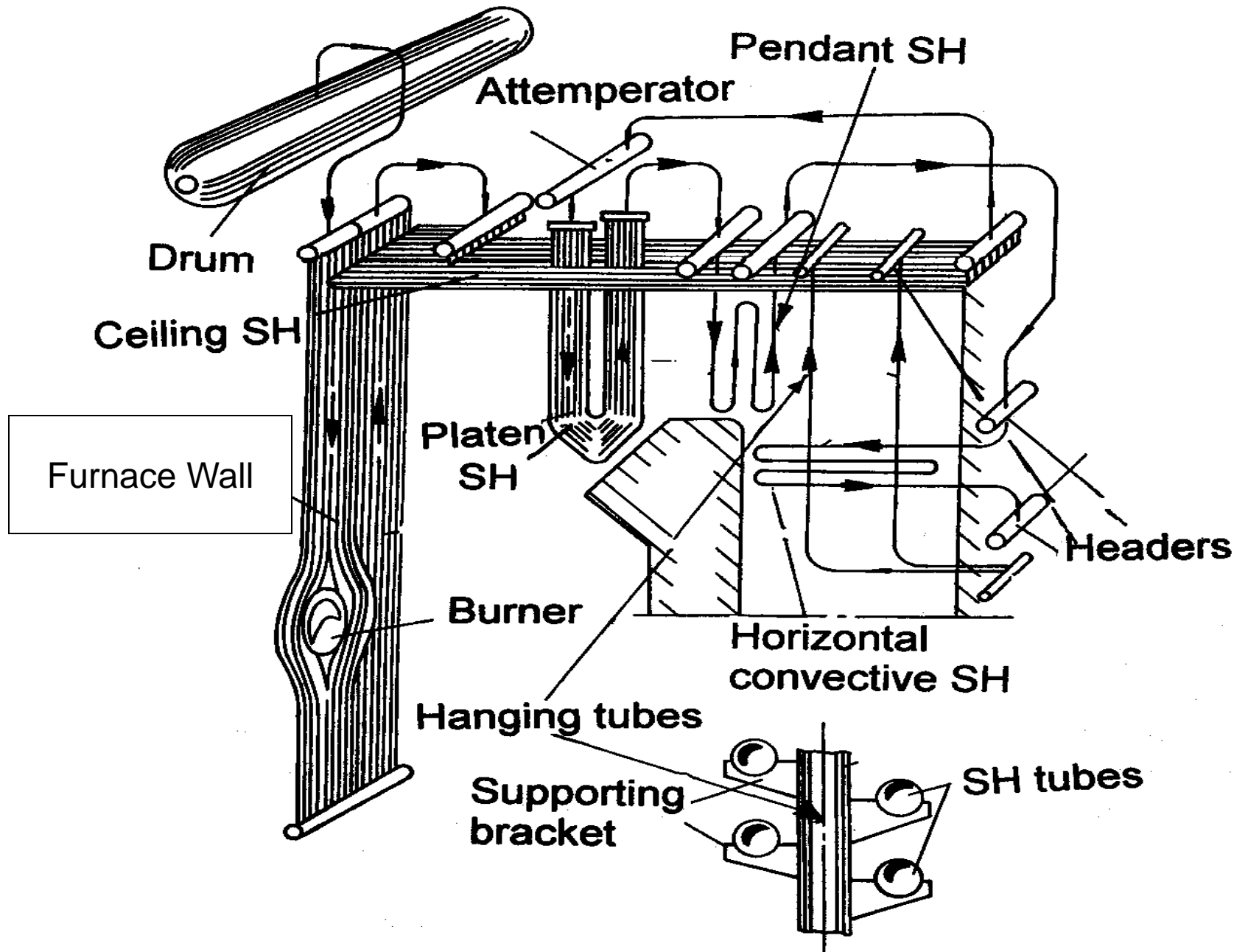


- Air needed for combustion
- Flue are needed to be evacuated
- Losses due to flow need to be overcome



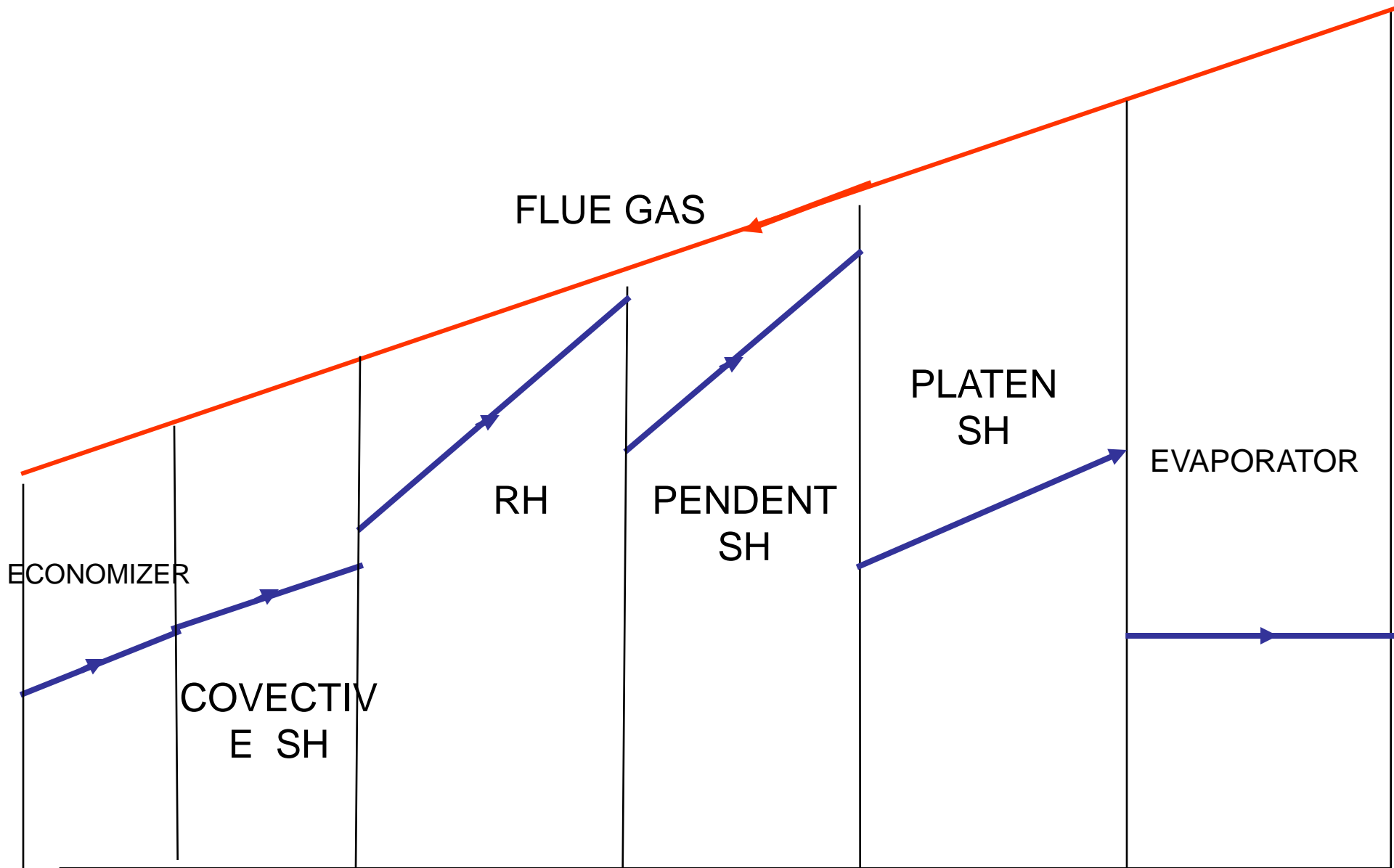
More Details of Pulverized Fuel fired SG

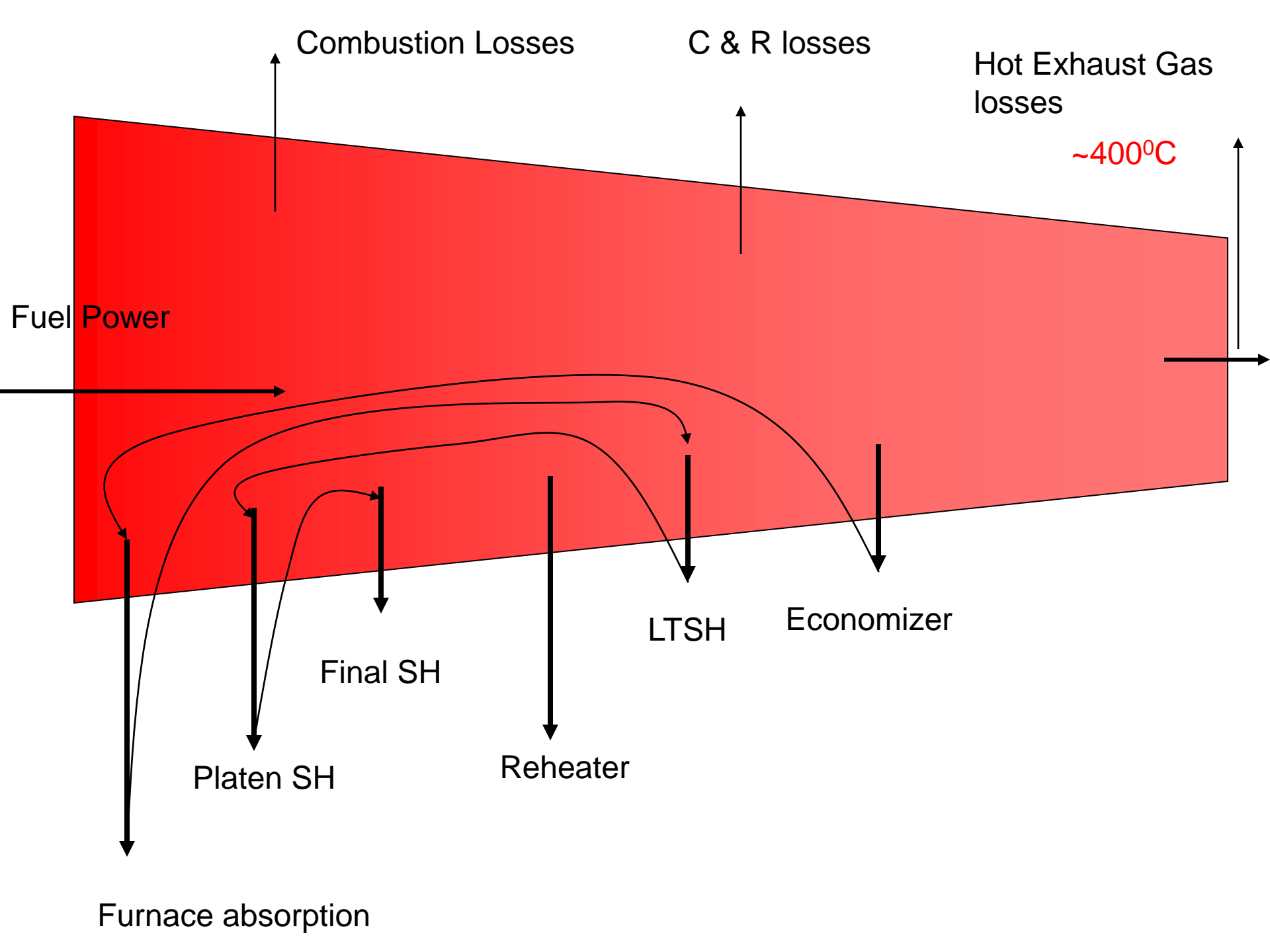




Flow arrangements of different types of superheaters

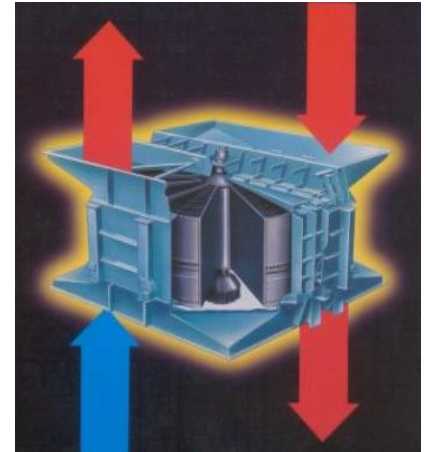
Sequence of Energy Exchange from Flue Gas to Steam



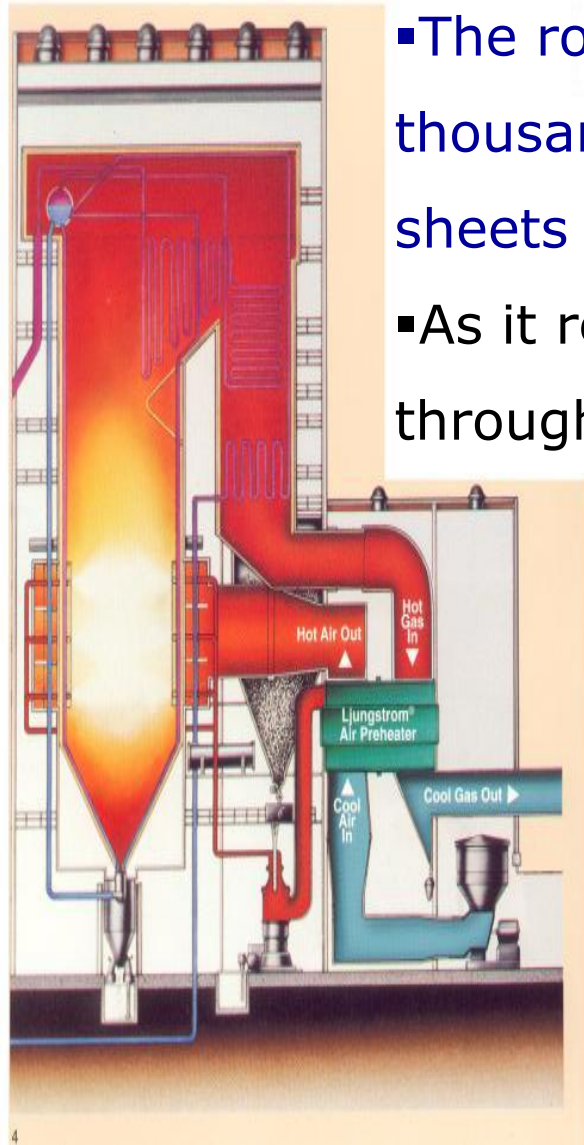


Air Heater in Fossil Fired Plant

- The rotating cylinder packed with thousands of sq m of specially formed sheets of heat transfer surfaces.
- As it revolves, heat of FG is absorbed through one half.



- The accumulated heat is released to the incoming air as the same surfaces pass through other half.
- The heat transfer cycle is continuous as the surfaces are alternately exposed to the outgoing gas and incoming air.



Air Pre-Heater

- An air pre-heater heats the combustion air where it is economically feasible.
- Reducing the stack gas temperature and increasing the boiler efficiency.
- The pre-heating helps the following:
 - Igniting the fuel.
 - Improving combustion.
 - Drying the pulverized coal in pulverizer.

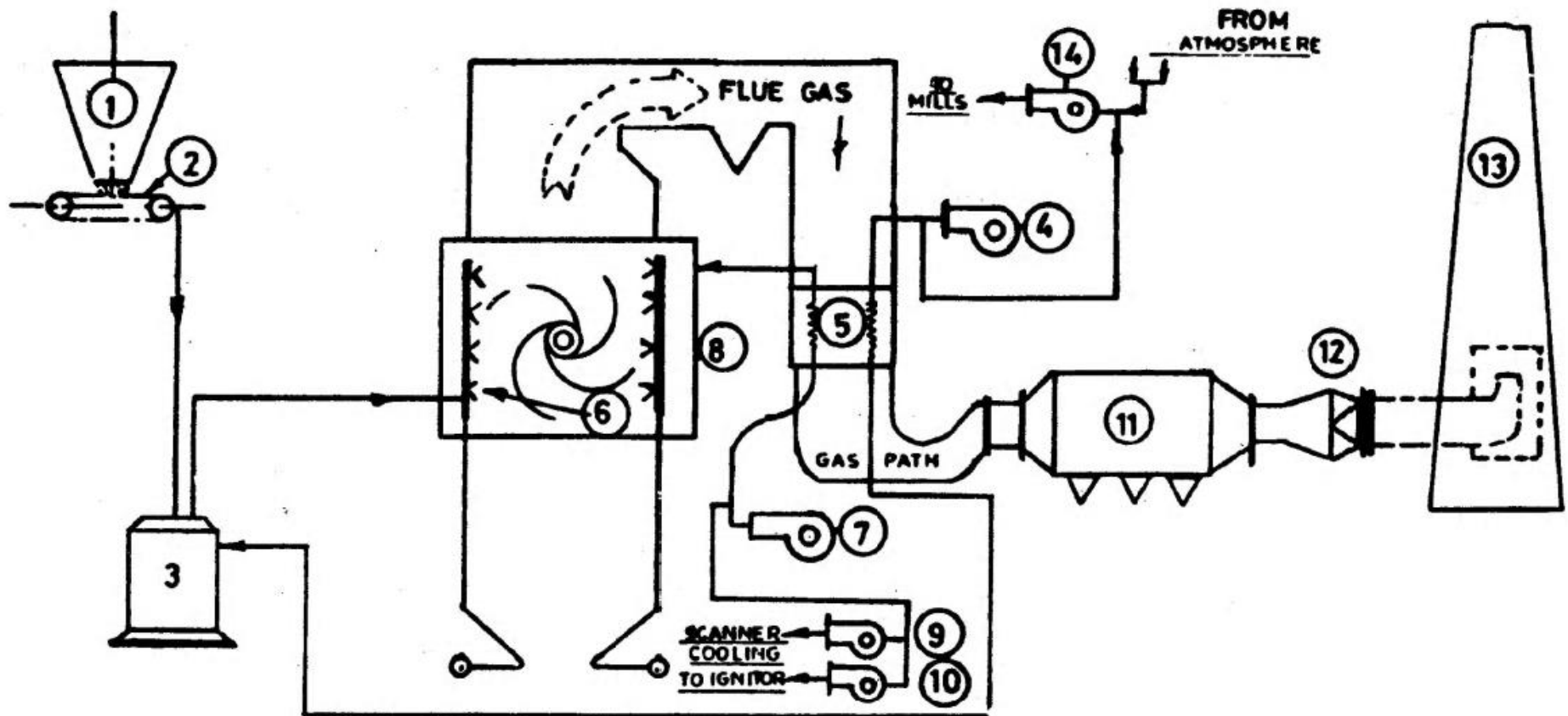
How to select a fan

- Air or Gas flow -Kg/hr
- Density (function of temperature and pressure)
- System, resistance (losses)

Major Fans in Boiler Draft System

- PA Fans
- FD Fans
- ID Fans

Arrangement of Boiler Auxiliaries



1. COAL BUNKER
4. P.A. FAN
7. F.D. FAN
10. IGNITOR FAN
13. CHIMNEY

2. FEEDER
5. AIR PREHEATER
8. WIND BOX
11. ELECTROSTATIC PRECIPITATOR
14. SEAL AIR FAN

3. MILL
6. BURNER
9. SCANNER FAN
12. I.D. FAN

PRIMARY AIR/MILL SEAL AIR SYSTEM

- Ambient air is drawn into the primary air ducting by two 50% duty, motor driven axial reaction fans.
- Air discharging from each fan is divided into two parts, one passes first through a air pre-heater then through a gate into the P.A bus duct. The second goes to the cold air duct. The mix of both is used to carry the pulverized coal to the boiler.

Components of PA Fan

- **Suction Bend With volume Measurement instruments**
- **Fan housing with Guide Vanes**
- **Main Bearings (Anti Friction)**
- **Rotor with impeller with adjustable blade with pitch control**
- **Guide vane housing with guide vanes**
- **Diffuser with pressure measurement instruments**

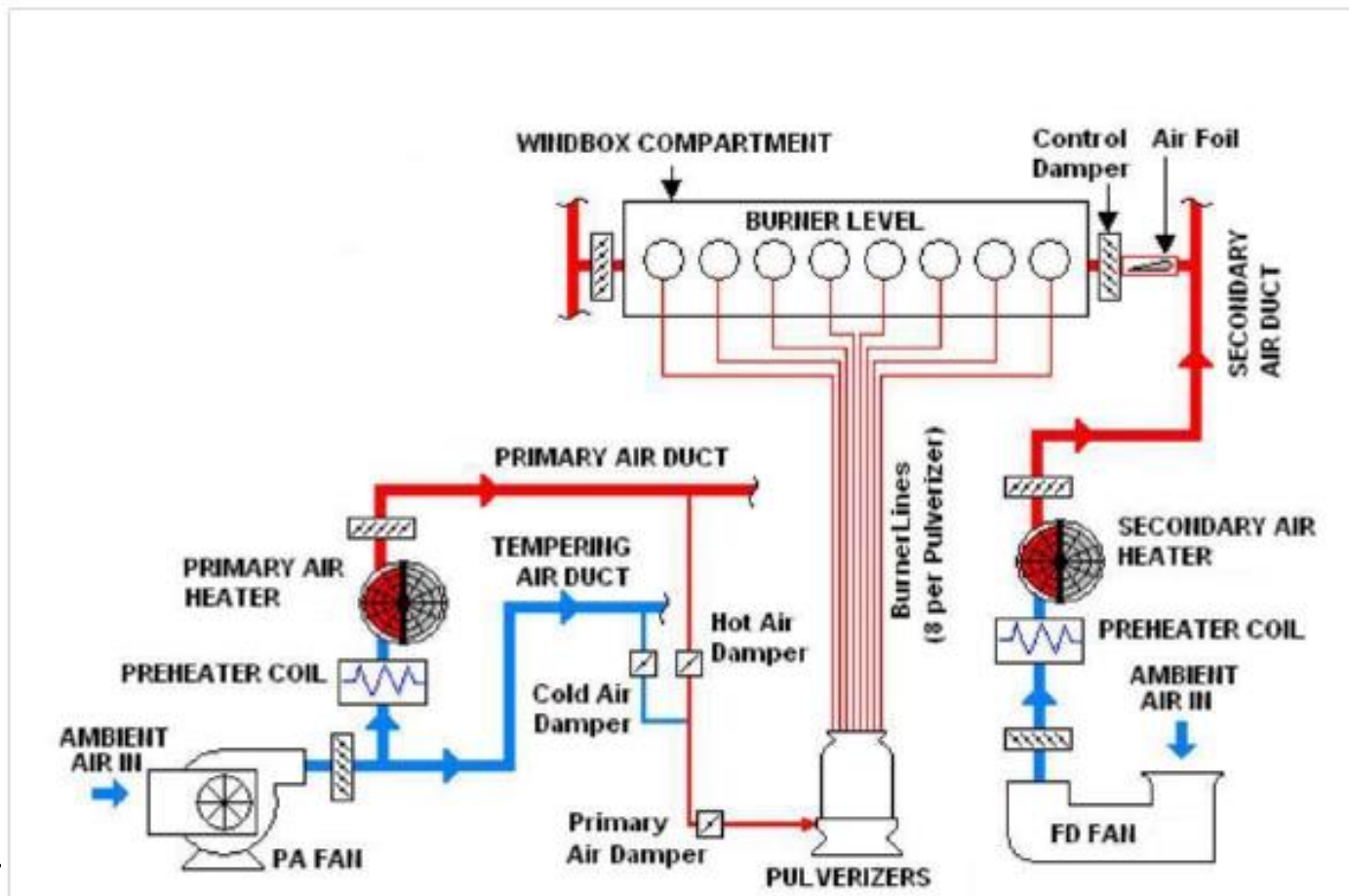
SECONDARY AIR SYSTEM

- Ambient air is drawn into the secondary air system by two 50% duty, motor driven axial reaction forced draft fans with variable pitch control.
- Air discharging from each fan passes first through a air preheated then through a isolating damper into the secondary air bust duct.
- The cross over duct extends around to each side of the boiler furnace to form two secondary air to burner ducts.
- At the sides of the furnace, the ducts split to supply air to two corners. Then split again to supply air to each of nineteen burner/air nozzle elevations in the burner box.

Burner Box Dampers

- Coal/Air Dampers
- Secondary Air Dampers
- Oil/Secondary Air Dampers
- Bottom Tier Secondary Air Damper
- Over Fire Damper

Primary and Secondary air System in the Boiler



Induced Draft System

- There are three induced draught fans per boiler, two operating and one standby
- In 500 MW fans are single-stage, double-inlet centrifugal fans. Principal fan elements of the fan are:
 - Housing
 - Inlet dampers
 - Rotor with Bearing
 - Shaft Seal

ID Fan

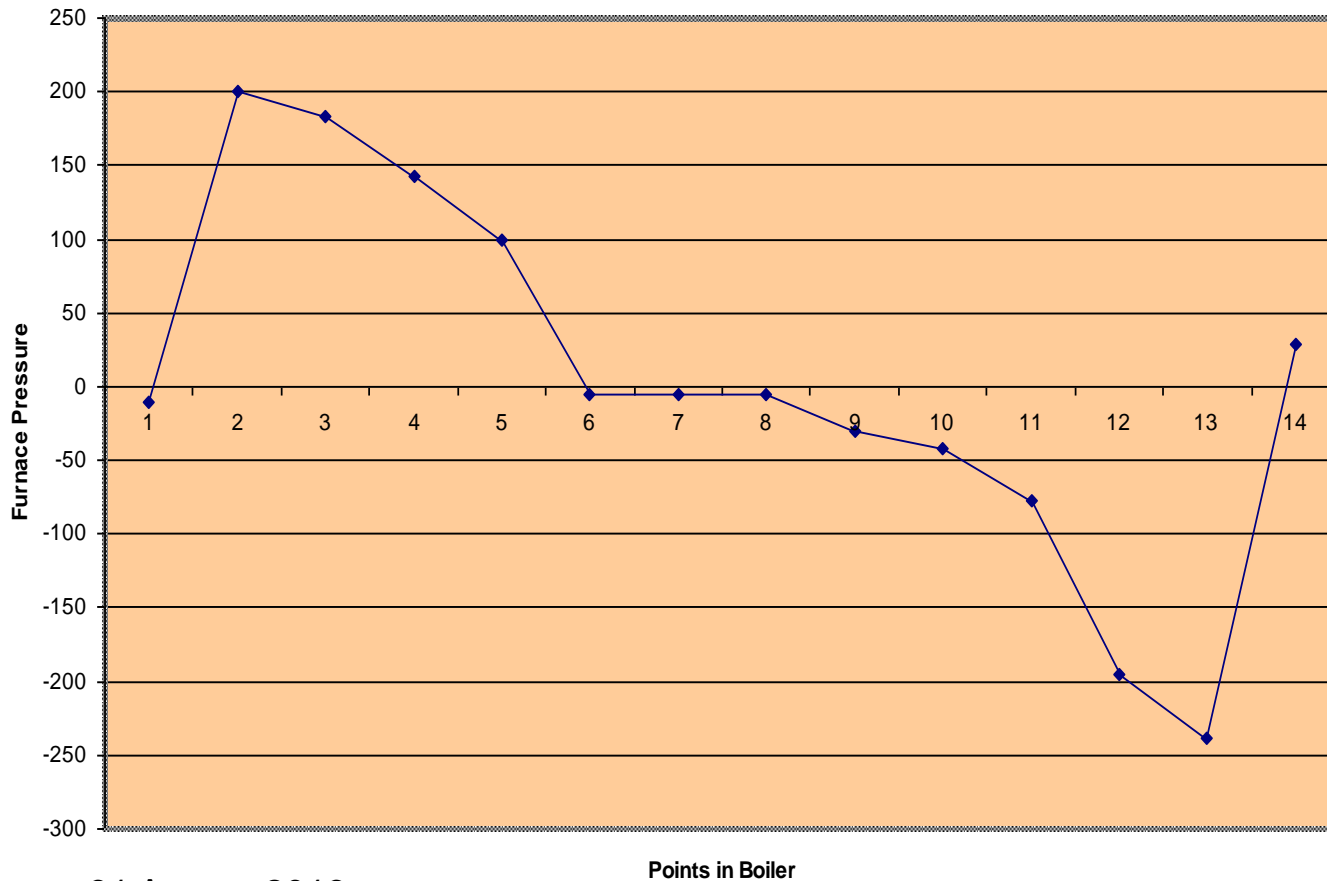
- The rotor consists of shaft and assembled impeller and runs in two sleeve bearings that are arranged outside of the housing.
- The impeller consists of a centre disc and two cover discs that are reinforced by forged rings. The bent blades are welded into position between the impeller discs.
- The blades are protected by screwed - on wear plates.
- The shaft is of hollow design. The fan shaft has been rated so that max. operating speed is below the critical speed. Impeller and shaft are connected by means of a flange. This screwing is protected by wear plates.
- The fan housing is sealed by means of two-part labyrinth seals.
- Bearings are lubricated with oil.

Other Fans in The System

- **Ignitor Air Fan:** Provide combustion air to the ignitors. Take suction air from the atmosphere and supplies air to the ignitor wind box.
- **Scanner Air Fan:** Supplies cooling air to flame scanners. Normally there are two fans taking suction from FD Fan discharge duct.
- **Mill Seal air fan:** Seal air fans provide air for the sealing of Mill bearing. Suction is from cold Primary air and pressure is boosted up to maintain the differential pressure

Variation of Pressure in Boiler

Furnace Pressure At Various Points in Boiler



31 August 2013

1	FD Fan Inlet
2	FD Fan Outlet
3	Airheater Inlet
4	Airheater Outlet
5	Windbox Pressure
6	Furnace
7	Superheater Platen Inlet
8	Reheater Inlet
9	LTSH Inlet
10	Economiser Inlet
11	Airheater Inlet
12	E.P. Inlet
13	I.D. Fan Inlet
14	I.D. Fan Outlet