AIR QUALITY MONITORING

WHAT IS AIR QUALITY?

- Complicated by a lack of knowledge as to what is "clean" and what we mean by quality.
- Main reason for air pollution control programs is to protect public health - define air quality based on its effects on people and the environment.
- Effects of air pollution are chronic and not immediately obvious.

MEASUREMENTS OF AIR QUALITY GENERALLY FALL INTO THREE CLASSES:-

- Measurements of Emissions - also called source sampling - when a particular emission source is measured, generally by on the spot tests.
- Meteorological Measurement - Measures meteorological factors that show how pollutants are transferred from source to recipient.
- Ambient Air Quality - Measures the quality of all the air in a particular place. Almost all the evidence of health effects is based on these measurements

AIR SAMPLING TECHNIQUES:

- Most air pollution monitoring equipment performs the act of sampling and analysis in one action = real time measurement.
- Older equipment = intermittent sampling (time lag between when the sample was obtained and when data was available).
- Almost all gaseous pollutants are monitored by real time analysis - Particulate pollutants are still mostly monitored by intermittent sampling, even though real time methods are available

AIR SAMPLING PROCEDURES:

- Conducted by static, grab, intermittent or continuous procedures.
- First air monitoring used Static sampling - simple and cheap – requires days for data e.g. deposit gauge.
- Grab sampling not commonly used to monitor ambient air quality – uses bladders of syringes.

SITE SELECTION:

General Requirements for Site Selection

- ❑ purpose of monitoring.
- ❑ Number and type of instruments required.
- ❑ Duration of measurements.
- ❑ Best available general guide comes from AS2922.
- ❑ Should be easily accessible.

CHOICE OF MONITORING EQUIPMENT:

- For almost every type of air pollutant there are several different acceptable methods of analysis.
- The type of equipment and methodology used for analysis may be determined by many factors such as
  - cost
  - the number of data points required
  - the purpose for which the data are being used
  - the time interval required between data points
  - the devices power requirements
  - the type of air pollutant, and
  - the environment in which the monitoring equipment is being placed

CALIBRATION PROCEDURES:

- When a device uses airflow input need to calibrate the airflow system.
- Involves using a device or a pre-calibrated gas flow meter to check on the ambient airflow into the device.
- All devices MUST be calibrated according to manufacturer's spec's in maintenance manual - times and results of these MUST be kept in the instrument logbook.

TWO TYPES OF CALIBRATION PROCEDURES COMMONLY USED ON AIR MONITORING EQUIPMENT:

- Static methods - Involve a simple one point electrical or chemical test.
- Dynamic methods - Based on generating a flowing stream of calibration gas – which is used to calibrate the whole instrument = preferred method for calibration.

AIR POLLUTION CONTROL EQUIPMENT:

Equipment presently available to control air pollution are:

I. Gravitational settling chamber
II. Cyclone separator
III. Fabric filters
IV. Electrostatic precipitators
V. Spray towers

GRAVITATIONAL SETTLING CHAMBER:

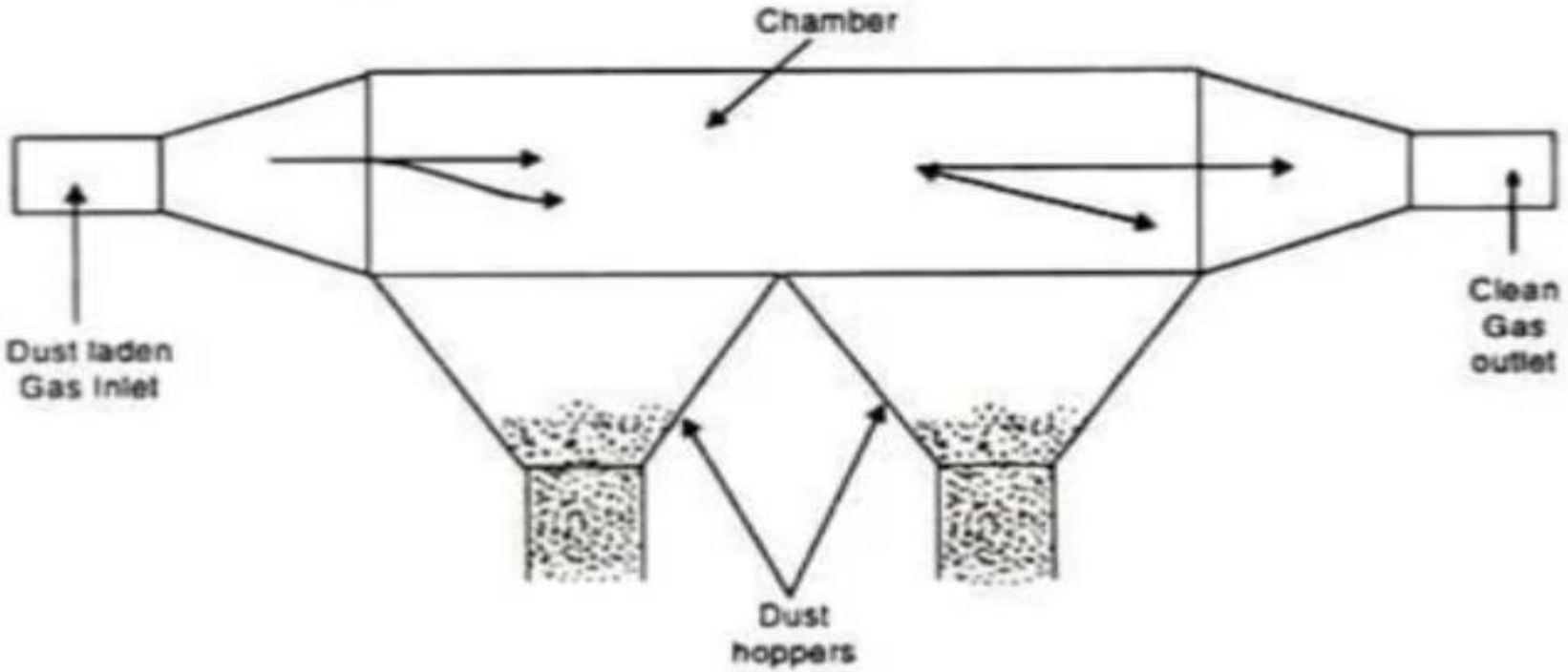
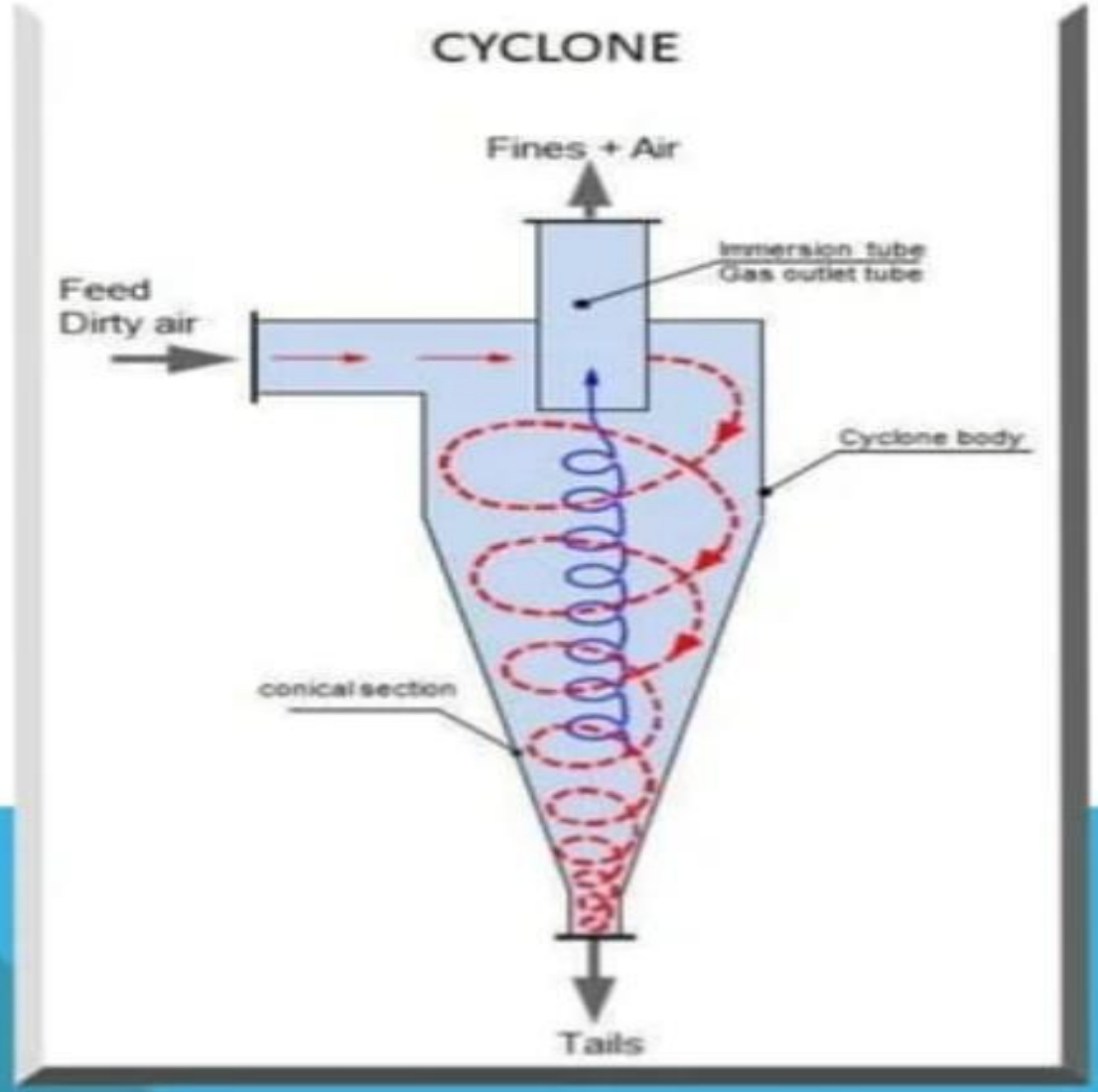
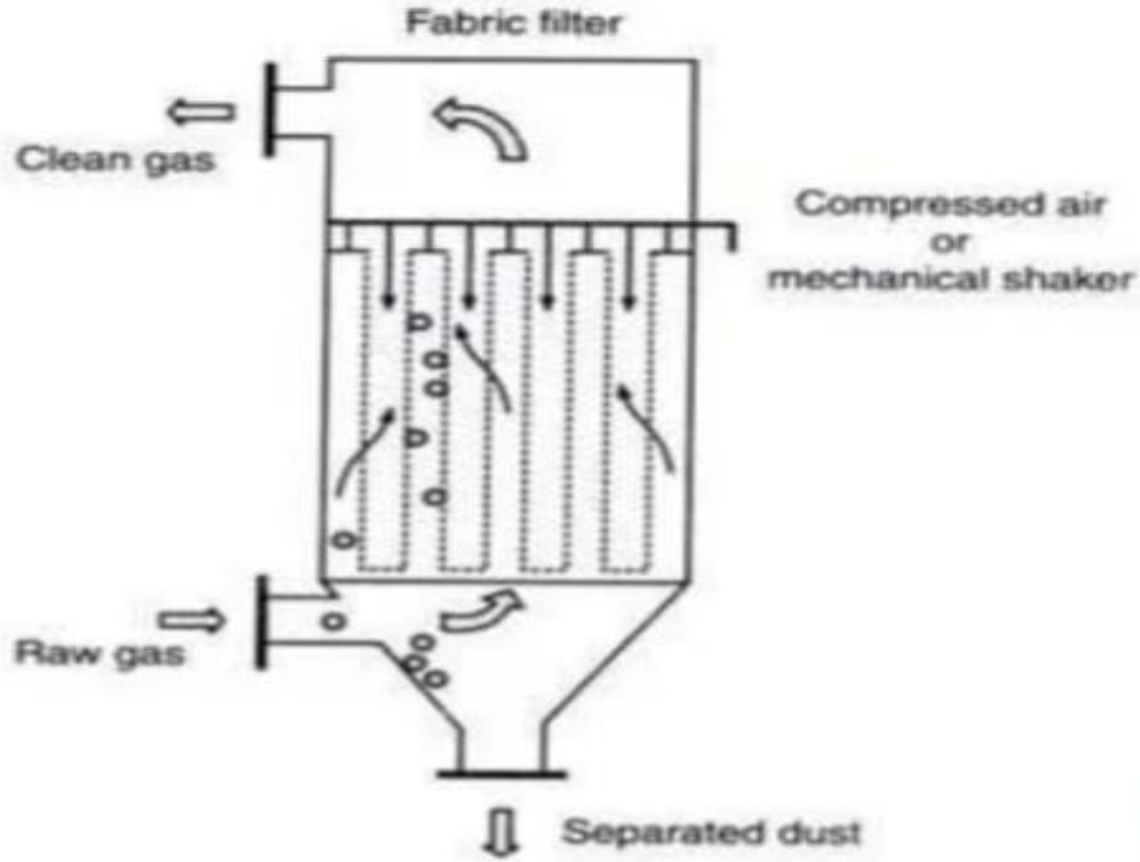


Fig. 6.4. Horizontal Flow Settling Chamber.

CYCLONE SEPARATOR:



FABRIC FILTER:



Fabric Filters

ELECTROSTATIC PRECIPITATOR:

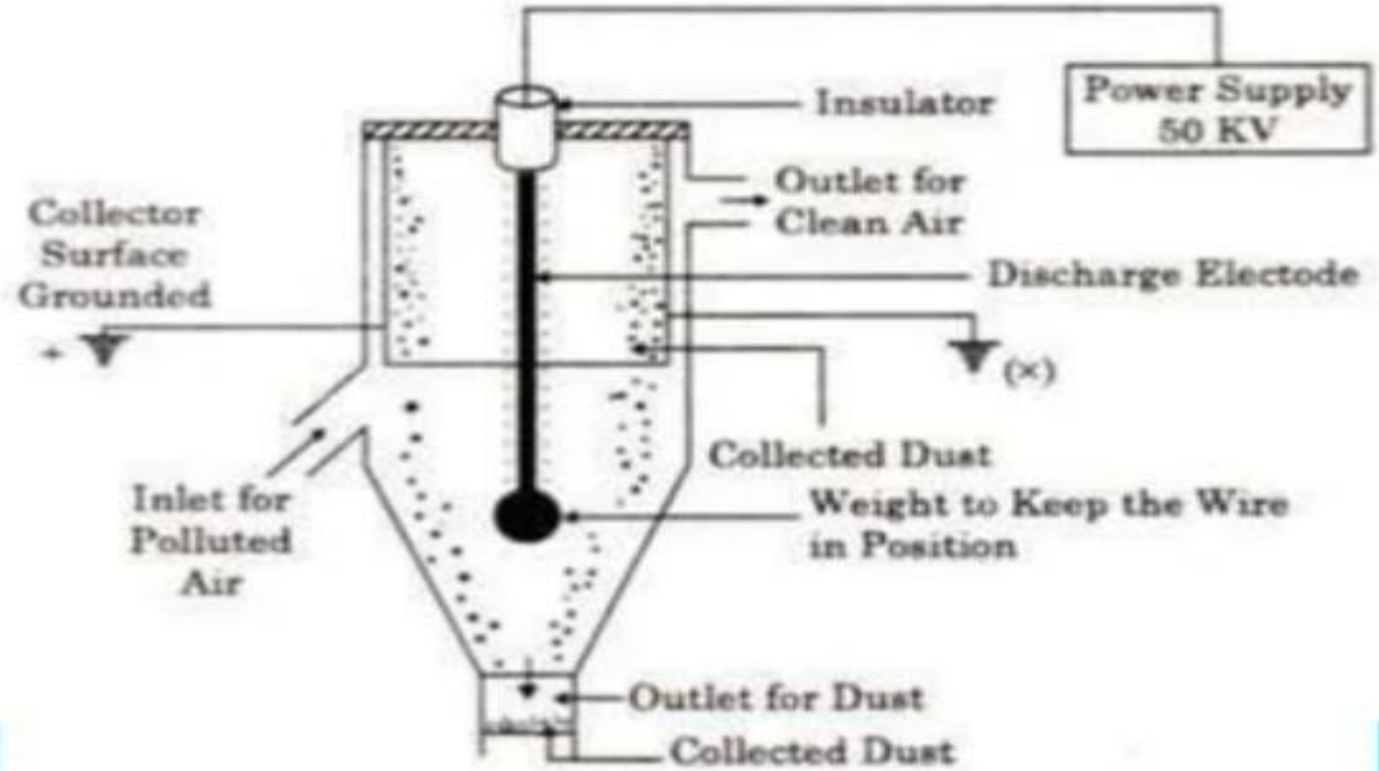
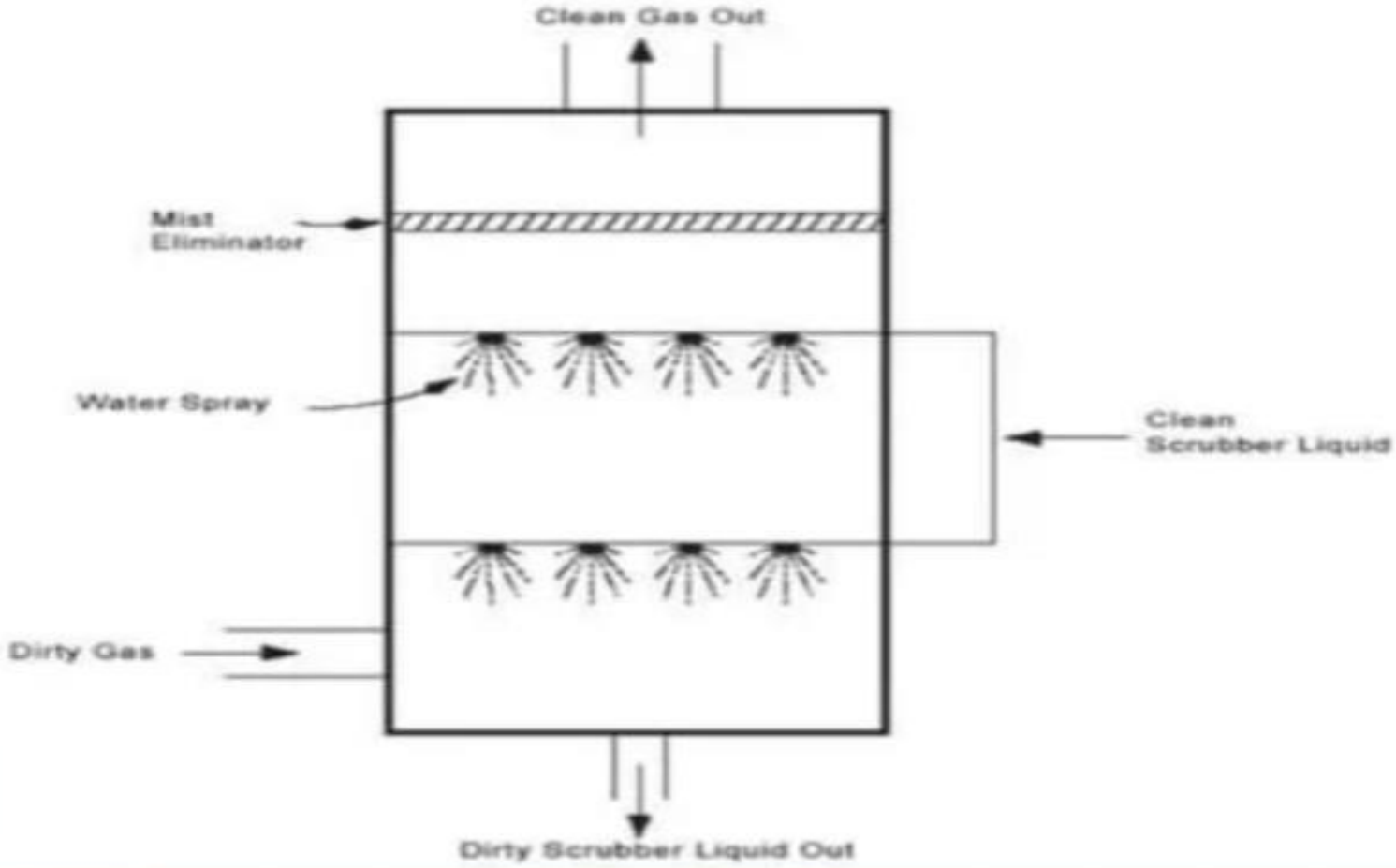


Fig. 5.4 Electrostatic Precipitator

SPRAY TOWER:


Clean Gas Out
Mist
Eliminator
Water Spray
Clean
Scrubber Liquid
Dirty Gas
Dirty Scrubber Liquid Out

LEGISLATION FOR CONTROL OF AIR POLLUTION:

According to the Environment Protection Act of 1986, Environment is that which includes the "inter-relationship which exists among and between water, air, and land and human beings, other living creatures, plants, micro-organism and property."

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- In this Act, power to declare air pollution, control areas has been given to the state government after consulting the State Board.
- By this, it may control or even prohibit burning of certain materials in those specific areas.
- This Act requires approval prior to operating any industrial plant.

THANK YOU