

Analysis of Air Pollution Control Devices

Prof. Y.D.Chintanwar¹ Dhanshree Rokade² Rechal Chawhan³ Samiksha Kawale⁴

¹Assistant Professor ^{2,3,4}UG Student

^{1,2,3,4}Department of Civil Engineering

^{1,2,3,4}Priyadarshini J.L. College of Engineering, Nagpur, Maharashtra, India

Abstract— There are various sources of air pollution like power plants, oil refineries, industrial facilities, factories etc. It consist of pollutant particles like NO_x, SO₂, Ozone, CO, PM_{2.5} etc. which are very hazardous to human health. To purify air there are many devices among which fabric filter is most efficient. They collect particles with sizes ranging from submicron to several hundred microns in diameter with better efficiency.

Key words: Pollutant Particles, PM_{2.5}, NO_x, Ozone, CO, Fabric Filter

I. INTRODUCTION

Air pollution means the presence of chemical or compound in the air which are usually not present and which lower the quality of air or causes detrimental changes to the quality of life. According to Indian scenario the Northern hemisphere states are at higher risk of air pollution. The industries and factories release large amount of toxic gases.

The pollutant are mainly of two types i.e., primary and secondary out of which RSPM is very hazardous which causes cancer and lungs diseases whereas SPM get settle down. The pollution due to PM affects tremendously to the human health. on the basis of size, the PM is categories as PM_{2.5} and PM₁₀. The pollution due to PM_{2.5} is particularly harmful as it directly enter to human bronchi and lungs. There is an urgent need to reduce pollution by air pollution control device which should be cost efficient, simple to operate, require less maintenance and effective. There are many devices to control air pollution but fabric filter is more appropriate

II. OBJECTIVES

- To reduce the amount of harmful pollutant from air which minimize the health hazard.
- To design an efficient air pollution control device.
- To removed, destroy or transform in the control device, the pollutants before discharging into the ambient air.
- To eliminate the damage caused to plants.
- To reduce the PM content from air which minimize the health hazard.
- Prevention of physical damages to the property.

III. TYPES OF FILTER

1) Electrostatic precipitator

An electrostatic precipitator (ESP) is an device that removes dust particles from a flowing gas (air) using the force of an induce electrostatic attraction (i.e, like charges repel ; unlike charges attract).

2) Cyclonic separator

Cyclonic separator is a method of removing particulates from an air, gas or liquid stream. A gas cyclone is use to remove particulate matter. A high speed rotating flow is established with a cylindrical or conical container called a cyclone. Air flows in a helical pattern, beginning at the top (wide end) of the cyclone and ending at the bottom (narrow end) before exiting the cyclone in a straight stream through the centre of cyclone and out the top.

3) Wet scrubber

The term wet scrubber describes a variety of devices that remove pollutant from a furnace flue gas or from other gas streams In a wet scrubber, the polluted gas stream is brought into contact with the scrubbing liquid , by spraying it with the liquid, by forcing it through a pool of liquid, or by some other contact method, so as to remove the pollutants.

4) Fabric filter

A fabric filter is a dust collection device using a woven or non woven filter bag that filters and collects the dust in process gas. The air is passes to the filter media i.e. bags through the inlet and pollution particles get trap into the bags and purified air is passes through outlet.

IV. EFFECTIVENESS OF FABRIC FILTER OVER OTHER:

- Fabric filter has no corrosion problem.
- Fabric filter has relatively simple operation than other.
- Fabric filter has simple maintenance. It has very easy cleaning mechanism.
- Water is not used in the mechanism of fabric filter, therefore, no waste water disposal after treatment as in wet scrubber.
- Fabric filter can be used in commercial and industrial purpose.
- Fabric filters are available for removal of all PM size ranging from 0.2 to 10 μ .
- Fabric filter required less space as compare to other filters.
- No combustion and explosion hazard when dealing with combustible gases till a certain dust concentration of 50gm/m³.
- High collection efficiency of submicron smoke and gaseous contaminants through the use of selected fibrous.
- It is cost effective than ESP and wet scrubber.
- Relatively low energy consumption than other.

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