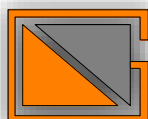




VPSA BASED BIOGAS PURIFICATION SYSTEM

GREEN ENERGY



Committed To Quality

AIR-N-GAS PROCESS TECHNOLOGIES

AN ISO 9001:2015 CERTIFIED COMPANY

www.air-n-gas.com



Introduction

Any organic waste (vegetable or animal, terrestrial or marine, liquid or solid) is digestible and can be transformed into biogas. Without a doubt, a biogas plant is one of the most ecological energy generation processes that exist today. The use of biogas plants is the most efficient “control of the organic decomposition process” that exists to date.

A biogas plant processes any type of organic waste (vegetable & animal, liquid or solid) and in a contained process is transformed into energy. Biogas is an energy-rich gas produced by anaerobic decomposition of biomass. It is produced from waste / bio-mass sources like agriculture residue, cattle dung, sugarcane press mud, municipal solid waste, sewage treatment plant waste, etc. Biogas, a renewable fuel, constitutes mainly of methane (~60%), carbon dioxide (~40%), and traces of hydrogen sulfide. It can be burned directly as a fuel or purified & upgraded by removing carbon dioxide (CO₂), hydrogen sulfide (H₂S) and compressed to make Compressed Bio-Gas (CBG). The CBG has methane content of more than 90%, which is similar to the commercially available natural gas in composition and energy potential.

Purification of Raw Biogas

Production of biogas could be a continuous process. The utilization of biogas as an efficient energy source depends strongly on its methane concentration. Therefore, biogas purification is essential in order to have more energy per unit volume of compressed biogas and to get rid of the corrosive effect of H₂S. Biogas purification process increases the methane concentration and decreases the carbon dioxide concentration in biogas, which in turn would result in higher calorific value. The purified biogas is compressed as CBG with methane content of more than 90%, and the CBG shall be complied to IS 16087:2016 specifications of BIS.

Some of the technologies which are prevalent in removal of carbon dioxide are

1. Pressure Swing Adsorption (PSA)/Vacuum Pressure Swing Adsorption (VPSA)
2. Water scrubbing
3. Membrane Separation
4. Chemical scrubbing - Monomethylamine (MEA) system

Principle of PSA / VPSA Biogas Purification

PSA biogas purification system is the gas separation system with specially designed adsorbent. This adsorbent is called Molecular Sieves (MS) having a micro pore on its surface and adsorb CO₂, N₂, H₂S and H₂O molecules selectively under a certain pressure. After adsorption process, adsorbent is regenerated by depressurizing. These PSA systems produce the Purified Methane enriched gas continuously by repeating above adsorption and regeneration process.

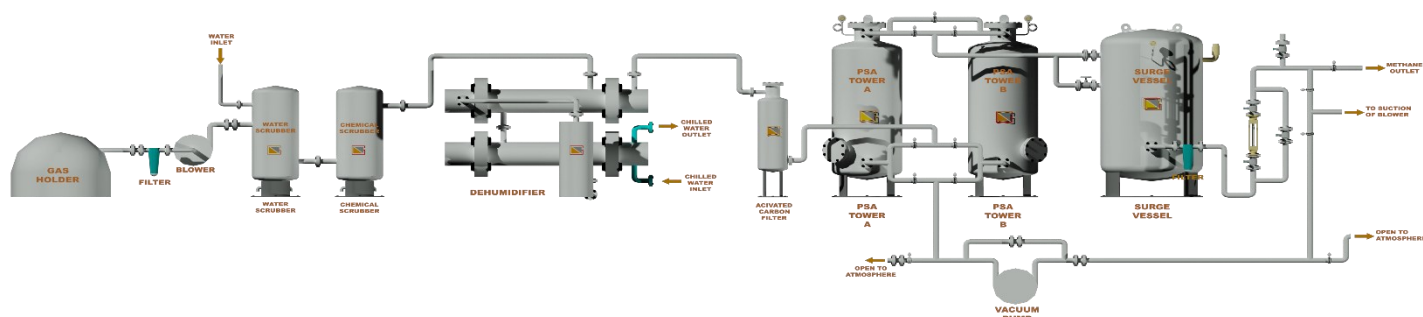
Features of VPSA Biogas Purification System

- High Efficiency with lower maintenance
- Lower Energy Consumption for generation
- Low Noise during operation & Eco-Friendly fuel generation
- High Performance, stable & user-friendly Operation
- Simple Control with centralized control system

Advantages of VPSA Biogas Purification System

- High class Gas Quality.
- Low methane losses & low energy demand.
- World class bought out items for optimum operations.
- Efficient control panel to set important operative parameters easily.
- Designed to work 24 hours, round the clock.
- Operator friendly machine, hence easy to operate and maintain.
- Consistent purity of gas is achieved.
- Study design to ensure long life and trouble-free operation.
- Clean process requiring very less floor area.

Schematic Diagram of the system



VPSA system has different stages to perform for purification of the Bio gas. Firstly, Bio gas stored in the gas holder goes through Suction process by Blower and pressurized. The pressurized Biogas passes through water Scrubber. In this process, water is used as an absorbent to remove partially H₂S and ammonia. The water is supplied from the top of the column while the raw biogas is allowed to pass from the bottom to top. Ammonia and H₂S trapped in the water and CH₄ with CO₂ and some traces of other gases along with moisture leave at the top of the water scrubber. After water scrubbing the gas passes through Chemical Scrubber where further H₂S is trapped in iron flakes. After Chemical Scrubber process, the gas is made to pass through customized Biogas Dehumidifier where gas is cooled down to 8-10 Deg C and moisture is condensed and removed in cyclonic moisture separator which is automatically discharged through auto drain valve. Now the outgoing low temperature gas is passed through economizer / reheater to reduce the inlet Biogas temperature to reduce load on chiller and also outgoing gas is heated up to 30 Deg C for enhancing the RH of the Dehumidified gas so that no further condensation takes place due to expansion in Adsorber Towers. Next, we are using Activated Carbon Filter to remove impurities like H₂S, VOC & Siloxane etc., For further purification of Bio Gas, we use VPSA technology. This method is particularly used to remove CO₂ present in cleaned and dehumidified biogas. The dry biogas (after moisture removal) enters at the bottom of the adsorption column filled with different grades of molecular Sieves, Activated Alumina/Silica Gel where CO₂ is adsorbed and pure dry methane leaves from the top of the towers which is sent to a surge vessel for analysis. When one tower is in Adsorption process the other adsorber tower undergoes in Regeneration by depressurization process and vacuum with the help of a vacuum pump. The exhaust gas mainly containing CO₂ is released into the atmosphere at elevated height. After a preset timing the process is changed from one tower to another to keep producing the pure gas continuously. It is done through automatic changeover valves signaled through a PLC. Stored pure gas in surge vessel is analyzed for purity and sent to the final storage if minimum methane percentage is achieved.

Company Profile

Air-N-Gas Process Technologies was established in the 2007, with an aim to boost the technical advances in the field of Adsorption based Gas Separation Systems, Air Filters and Air Dryers. In this short span of time, we have earned ourselves a niche in the air dryer's industry and have established a great rapport amongst the leading manufacturers, exporters, traders and suppliers. Supported by a group of efficient technocrats, we are headed by Mr. Shailesh Verma (B.Tech-Mech DMM), who has accumulated a rich experience of more than 27 years in the respective field.

Some of our Major Clients



Our Other Products



PSA N2 PLANT



MEDICAL O2 PLANT



HEATLESS DRYER



HOC DRYER



SFNPL DRYER



REF. DRYER



BIOGAS DRYER

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