Adsorption Solutions

Air Liquide Global E&C Solutions offers industrial producers a range of adsorption technologies, such as Pressure Swing Adsorption (PSA), Vacuum Swing Adsorption (VSA) and Vacuum Pressure Swing Adsorption (VPSA), as well as Thermal Swing Adsorption (a.k.a Front End Purification (FEP) or dryers).

Since the 1960's, Air Liquide has been a pioneer in the development of adsorption technologies and processes. Air Liquide Global E&C Solutions now offers industrial producers a wide range of adsorption technologies.

Pressure Swing Adsorption

Pressure Swing Adsorption (PSA) technology works on the principle that at high partial pressure, certain gases are preferentially captured by an adsorbent and released when the pressure is decreased.

The PSA unit can be used for H_2 purification from syngas after Steam Methane Reforming (SMR), CO Cold Box or Partial Oxydation (POX) mainly for Refinery (desulfurization), Petrochemical and Chemical markets. The purity of this H_2 is up to 99.99%, with H_2 recovery as high as 90% depending on conditions.

Under this process, an H_2-rich raw gas (min. 50%) stream is sent at high pressure to a vessel filled with adsorbents where components such as N_2, CnHm, CO and CO_2 are stopped, while H_2 passes through.

PSA units can also be used to separate synthesis gas (syngas) from CO_2, for example, in steel mill (blast furnace) applications. A CO_2 purification unit can be added to further purify the PSA offgas, which produces pure CO_2 for sequestration.

Vacuum Swing Adsorption

EOX is the name of our new on-demand oxygen generator, based on vacuum swing adsorption (VSA), a historically proven air separation principle. It has a low purity oxygen production capacity of up to 150 tons per day.

The EOX process uses a selective adsorption technology, which separates oxygen from air passing through a molecular sieve bed. The regeneration of the sieve is achieved by pressure variation under vacuum.

This technology was developed to better address the growing demand in oxygen for various industries such as glass melting, steel making, pulp and paper production and bleaching, and waste water treatment.

The product line is designed to meet industry needs at a very competitive cost, allowing for greater on-site oxygen opportunities. The two standard oxygen purities available are 90% and 93%.

All EOX plants come standard, and can be installed, commissioned and started up in less than two months if all utilities are provided and civil work properly achieved. EOX are made up of a number of modules easily connected together.

Vacuum Pressure Swing Adsorption

Vacuum Pressure Swing Adsorption (VPSA) for $C0_2$ is a similar technology that can be used particularly effectively for CO_2 capture on blast furnace gases. This technology has been adopted on an industrial pilot plant in Sweden, operating since 2007.

Front End Purification (FEP)

TSA (Temperature Swing Adsorption) units are used for drying and/or de-carbonating Air or Syngas upstream all cryogenic separation. Their function is to prevent CO_2 and H_2O to enter and freeze into the coldest parts of the downstream process.

Usual FEP units are constituted by two bottles filled with Adsorbents. The two bottles are alternatively in Adsorption phase and regeneration phase in order to insure a continuous dryed and/or de-carbonated stream to the following Cold Box.