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СИСТЕМЫ КОНТРОЛЯ ВЫБРОСОВ ЭЛЕКТРОФИЛЬТР СУХОЙ И ВЛАЖНЫЙ

Технические характеристики

ELECTROSTATIC PRECIPITATOR (DRY AND WET)

GEA’s Electrostatic Precipitator (ESP) uses electrostatic force to remove particulates from a flue gas stream.

The physical principle applied in ESP sets no limit on the fineness of the particles to be collected, making it possible to achieve virtually any desired collection efficiency.

The dust particles suspended in the gas are electrically charged and migrate under the influence of a strong electric field towards the collecting electrodes where they are deposited.

The collecting electrodes are connected to earth via the precipitator casing.

The discharge electrodes (normally barbed strips or round wires) are suspended from insulators and have a negative polarity. They carry a direct current voltage that ranges from 20 kV to more than 100 kV depending on the precipitator´s design and application. In the immediate vicinity of the discharge electrodes, corona discharges, generated thanks to the high filed strength, are produced and electrons are set free.

The negative gas ions produced, charges the dust particles which migrate under the influence of the electric field towards the collecting electrodes, there, they release part of their charge and are captured.

Electrostatic precipitators may be of parallel-plate, segmental, honeycomb or tubular design. All designs are suitable both for dry and for wet, mist-laden gases.

GEA´s experience building Electrostatic Precipitators goes way back with well over 12.000 units having been supplied to firms all over the world.

Dry Electrostatic Precipitator

The GEA dry Electrostatic Precipitator (ESP) is a highly effective, energy-and-cost-saving alternative to bag filters. Compared to a conventional bag filter, an ESP needs between 2 and 3 times less vertical space to clean a similar volume of gas.

An essential factor in achieving maximum collection efficiency is an even distribution of the gases over the entire cross-section of the precipitator. This is achieved through the optimized design of the precipitator's inlet transition and the installation of specially designed gas deflection and distribution plates.

Depending on the required gas volume flow and dust content reduction, the system is customized to suit the customer´s needs from a number of available options. Thanks to the employed materials, the ESP can withstand temperatures of up to 450 °C. The high temperature level allows an easy heat recovery downstream the ESP.

Working principle

Casing of frame-type design are a proven, reliable, and economical solution for horizontal precipitators.

In this type of Electrostatic Precipitator, the collecting electrodes are parallel vertical plates. They form passages, in the center of which, the discharge electrodes are suspended from insulators. The plates are shaped as to provide quiescent zones to prevent the collected dust from being stirred up and re-entrained by the gas stream.

The discharge and collecting electrodes are supported by box-type roof beams. The loads are transmitted via stanchions from the roof beam ends to the precipitator support structure. The roof covering and side walls are specifically designed to withstand the internal precipitator pressure and the wind forces.

The precipitators are equipped with rigid discharge frames made of welded tubes into which the discharge electrodes are securely fixed. This design eliminates electrode oscillations resulting from the electrical field and the gas flow. Firm fastening of the electrodes to the frame, e.g. by bolting and welding, prevents spark erosion at the fixing points.

The discharge frames of each precipitation field are suspended from four support insulators mounted on the roof structure of the precipitator casing.

Each insulator is equipped with electric heating to ensure that the temperature at the insulator will not be below the dew point when the plant is started up cold. If necessary, a small flushing air stream is used to keep the insulator interior clean.

Main Benefits

High degree of separation, even with fine dusts
Even flow distribution achieved through specially designed gas distribution plates tested with CFD modeling

Wet Electrostatic Precipitator

Wet Electrostatic Precipitators (WESP) are used in many processes in which dry separation is not possible due to the characteristics of the dust or gas. They are ideal for separating the finest dust-laden water droplets, aerosols and tar as well as oil-containing exhaust gases.

WESP are unmatched in terms of operational safety, durability and separation efficiency and are used to treat gas streams with sub-micron particulate, aerosol or fumes. These can include heavy metals such as lead, arsenic or cadmium, condensed acid aerosols like sulfur trioxide (SO_3) or condensed volatile organic compounds (VOC's). The use of electrostatic forces minimizes energy costs when compared to other technologies which require large amounts of energy to overcome resistance to air low

The GEA WESP is a proprietary, robust design with a unique alignment mechanism to hold electrodes rigidly in place. This reduces installation and maintenance times and improves performance. The field strength is consistently maintained at high levels with minimal sparking, resulting in the highest available efficiency. The greater the electrostatic fields strength, the greater the particle migration speed (speed component towards the collection tube). Increasing migration speed brings a higher particle collection efficiency with lower specific collection area (SCA) than conventional precipitators. Lower SCA means a smaller, less expensive unit.

Wet ESP

The principle and design of the wet-type precipitator is essentially identical to the dry type, the difference between them being the rapping systems.

As their use is limited to the cleaning of humid, saturated gases, mechanical rapping systems are not required for cleaning the discharge and collecting systems. The effect of the electric field causes a film of liquid to form on the collecting electrodes that continually drains off. In this way, any dust particles present are carried away in suspension. The precipitators are cleaned at set intervals by spray nozzles.

Tubular Wet ESP

Tubular precipitators consist of parallel vertical tubes with a circular or hexagonal cross section with the discharge electrodes suspended from insulators at their center. The tubes are earthed and form the collecting electrodes.

The discharge electrodes may be made of ordinary round wire stretched taut by weights. Other designs are starshaped and barbed electrodes made of lead with a supporting steel core. They are suspended from a top guide frame and anchored to the center of the tube. The bottom guide frame ensures that they are correctly spaced in the tube mid-sections at the bottom. The gas flow is, generally, in vertical direction.

the unit a versatile, multi-pollution system which has a proven performance that complies with the strictest emission limits encountered in the industry today and has the smallest available footprint.

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