

An Initial Exploration for Coulomb ESP

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Abstract: The coulomb ESP is fundamentally based on coulomb law which indicating the Coulomb force is inversely proportional to square of distance between two point charges. The sufficiently charged particles are all forced to dust-catching electrode by Coulomb force. Due to the velocity of wind around dust-catching electrode trends to zero, dust cleaning is on off-line mode, the secondary fly-up can be overcome. According to practical application, the inlet concentration and outlet concentration are 30 g /Nm³ and <10 mg /Nm³ respectively for a 3.5 m long electrical field. The de-dust efficiency is up to 99.95%. Coulomb ESP is a high efficiency ESP. It can either enhance dust removal efficiency of ESP and decrease its weight to 1/2. According to practical application, the inlet concentration and outlet concentration are 30g /Nm³ and <10 mg /Nm³ respectively for a 3.5 m long electrical field. The de-dust efficiency is up to 99.95 %.

Keywords: Coulomb force, square of distance, off-line mode

1 THEORETICAL BASIS

In the present patent, the open type dust-catching electrode is adopted and instead of shielding type dust-catching electrode. The coulomb ESP is fundamentally based on coulomb law ($F_{1,2} = k \frac{q_1 q_2}{r^2}$) which indicating the Coulomb force is inversely proportional to square of distance between two point charges (r^2) and directly proportional to carrier charges. Also, when transfer dynamic pressure to static pressure, the critical flow rate trends to zero, it is another very important mechanism. According to above two theoretical bases, the pollutant gas flow into and flow out ESP through one inlet and emit bypass. The charged particle was approach to the anode plate closely, that is $r \rightarrow 0$ and then Coulomb force became great. The specific surface increase greatly in the limited electric length, it can catch the high resistivity dust efficiently.

The flow route of flue gas is to open inlet channel and close the emit channel in the same side while the other side is opposite layout, that is the tail of entrance is closed.

The flue gas entered the main channel then flowed to the collect plate, the flue gas diffused into the next channel and flowed out the electric field, the gas around collect plate was closed to static state, and the process of cleaning ash was off-line, then the dust can not flow in the main channel, and there are the phenomena of discharge in the exit channel, the power line also has the dust-collect effect, so there will no secondary blowing dust and no turbulence phenomena.

In the normal ESP, the direction of flow gas is parallel with collect plate, and the dust in the central channel flue flowed into the end of electric field quickly at the speed of 1m/s. It is obviously of high resistivity dust.

The component of force consumed the electric power, it also decrease the de-dust effect, the manner was not changed since 1907 when F.G.Cottrell had invented the ESP, and according to the formula ($\eta = 1 - e^{-\omega f}$ or $\eta = \omega \cdot A$) to change the

problem, but it has no obvious effect. And the ESP will not meet the standard of environmental protection.

2 THE PRACTICALITY VALUE OF COULOMB ESP

The coulomb ESP technology can be applied into the new ESP only few changes in the anode system, so this is a significant technology renovate in ESP and environmental market, it can get obvious effect in the used-ESP, only changed the anode system and there will be 3-4 electric field effect only changed the first and second electric field, and the concentration of emit can reach 30 mg/m³ even 10 mg/m³. It will save a lot of investment and it the emission concentration reached the national standard whether the new project or the transform project.

3 THE APPLY FOREGROUND OF COULOMB ESP

Some experts thought the effect of ESP can not meet the national standard, because the emission concentration can not reach the 50 mg/m³ and the invention of coulomb ESP solved the problem, the emission concentration was only 10 mg/m³, and saved the investment and operational cost.

The coulomb ESP technology had applied the patent in china and international. Welcome to consult the technology and we hope it can be populated as soon as possible then to promote the development of environmental protection in china.

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