Electrostatic Precipitator in Power plants and Gasifiers

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Markets – Applications & Locations

- Acid Mist Collection – Titanium Dioxide
- Non Ferrous Smelters – Copper, Zinc, Nickel, Molybdenum, Zirconium, Gold
- Spent Acid Recovery
- Power Boilers
- Incinerators- Haz. Waste, Sewage Sludge
- Gasification
- Steel & Coke
- Automotive Spray Paint Finishing
- Chemicals & Pharmaceuticals
- Pulp & Paper
- North & South America, Europe, Asia and Africa
- Sub-Micron Particulate Emissions
- Visible Emissions
- Air Toxics (HAP) Emissions
- Hydrocarbon and Odor Emissions
- Acid mist
Acid mist before WESP

Clear gas after WESP
Precipitator Efficiency

\[ E = 1 - \exp[-(A/F)W] \]

Where

- \( A \) = collector area
- \( F \) = Gas flow
- \( W \) = Particle migration velocity
Precipitators work by charging particles.

Particles are charged in two ways:

Field Charging where the particles enters an electric field containing ions. The ions exchange their charge with the particle. Field charging works best with larger particles.

Diffusion Charging where brownian movement results in an ion bumping into a particle allowing the ion to exchange it’s charge with the particle. Diffusion charging works best with fine particles.
Comparison Of Tube Type

Precipitator Configurations

Plate

Round Tube

Square Tube

Gas Flow
Wet Electrostatic Precipitator Design Comparison

• **CORROSION RESISTANT DESIGN** – Corrosion resistant alloy, FRP, and lead.

• **SQUARE TUBE** vs. Round Tube - More Efficient Use of Space
  No wasted space, both inside and outside of tubes can be utilized with Beltran design

• **SHORTER TUBE LENGTH** – Easier to maintain Ionizer alignment

• **CONDUCTIVE FRP** over PP tube - Does not rely on water film for grounding, withstand temperature excursions better.
Wet Electrostatic Precipitator
Design Comparison

- **RIGID MAST ELECTRODES**
  - From alloy or lead.

- **MECHANICALLY STRONGER**
  - Easy to clean, more corona discharge points per rod

- **RIGID FRAME**
  - Does not elongate and move to affect ESP performance

- **ISOLATED INSULATORS**
  - No stabilizing insulators at the bottom in gas stream
Beltran WESP: in Bowater Halla Paper Co.

Beltran WESP: Heavy oil fired power station in petrochemical plant
10 WESPs cleaning smoke from stacks at Coal Fired Power Station
CESC - INDIA
CONCLUSIONS

The application of the BELTRAN Wet Tubular Electrostatic Precipitator demonstrates that:

- Tough particulate regulations can be easily complied with by this design.
- Sub-micron particulates resulting in high opacity can be removed.
- FRP WESPS effectively combine corrosion protection with high efficiency.