VT Corp

Vision To Clean

ISO 9001 2015

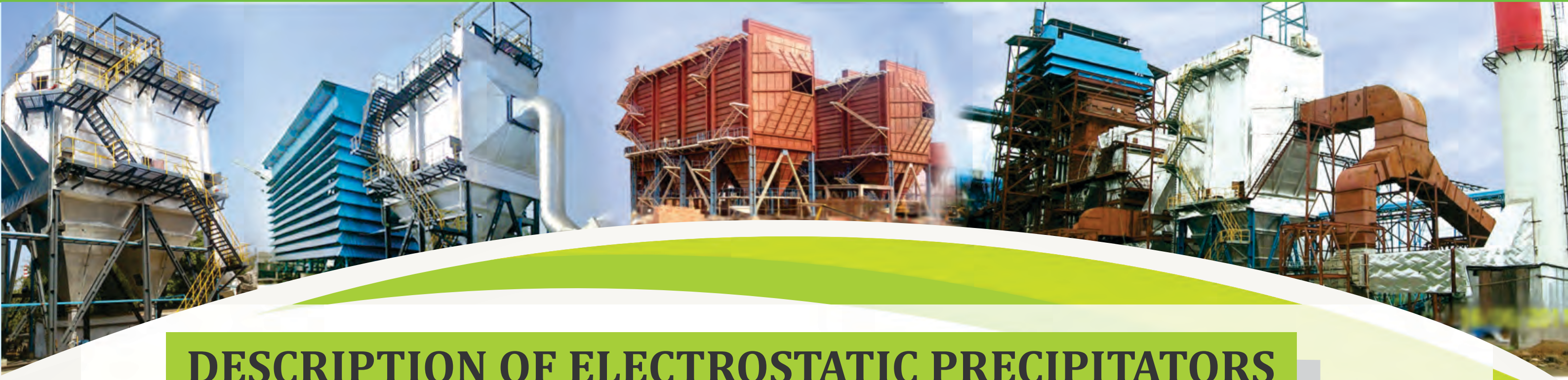
Electrostatic Precipitator

Protect the Environment

Gas Cleaning Plant

Better than the Best !

Presenting The Efficient And Affordable ESP
For Every Application.



DESCRIPTION OF ELECTROSTATIC PRECIPITATORS

The **VT CORP.** Electrostatic precipitator was introduced, considering the increasing demands of environmental protection. The precipitator technique has constantly been optimized. For several years the precipitator has been technically superior and the most economical dedusting system for numerous applications.

Dust concentrations at the precipitator inlet of a few grams up to serval hundred grams per m^3 can be reduced to any requested concentration at the precipitator outlet, e.g. to $20 mg/m^3$, or even lower for applications

V T CORP ESP MODELS AS PER RAPPING SYSTEM

VE-1: Bottom Rapping Tumbling Hammer Design

VE-2: Top Rapping Tumbling Hammer Design

VE-3: Top Rapping –EMIGI Design

FIELDS OF APPLICATION

Compared with other dedusting systems Electrostatic Precipitators have less maintenance work as well as fewer spare parts. The availability of VT CORP precipitators is excellent and is as good as the respective production plant i.e. klins before and mills.

The Principal Application of Electrostatic Precipitators are

- Production plants for iron and steel such as sponge iron ore, blast furnaces converters and scarfing machines.
- Production plant for cement, lime and gypsum such as klins, mills, dryers and coolers
- Coal and oil fired boilers, coal mills, incinerators for solid waste and sludge
- Gas producing plants
- Production plants in the chemical and pulp and paper industry

$$\eta = 1 - e^{(-\omega A/Q)}$$

Efficiency as per 'Deutsch' formula

η = Efficiency

ω = Migration Velocity

A = Total Collection Area

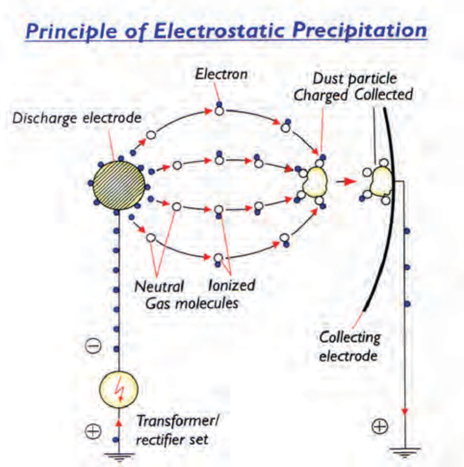
Q = Volumetric air flow rate in m^3/s

The electrostatic precipitator is suitable for the precipitation of solid particles. The particles are charged by a flow of ions from the discharge electrode and drift under the influence of the electrical field towards the collecting electrode. The cleaning of the collecting electrodes is achieved by periodic rapping for dry precipitators and by flushing for wet precipitators. The theoretical basis for the design of electrostatic precipitators was worked out for the first time by W. Deutsch in 1922, in a study concerning the motion and charging of electrical carriers in cylindrical capacitors. As a result of the studies, a fromula for the determination of separation efficiency was established. Various factors for precipitator sizing cannot be calculated; they are based on the experience. The specific electrical resistivity of the dust is the most important criteria for the determination of the precipitator size. Dust resistivities of up to the order of 10^{12} Ohm.cm permit economic and satisfactory precipitator operation.

SIZING

Dust with extremely high resistivity can be precipitated satisfactorily by employing more expensive methods. In order to improve the physical properties of the gas, various methods are used :

- **Alteration of operating temperature :** By selecting another location in the process and by evaporative cooling or cooling through an indirect heat exchange system, the precipitator installation can operate in a temperature range with a lower electrical dust resistivity. The increase of gas moisture content due to water injection, causes a reduction in the dust resistivity.



GAS AND DUST CONDITIONING :

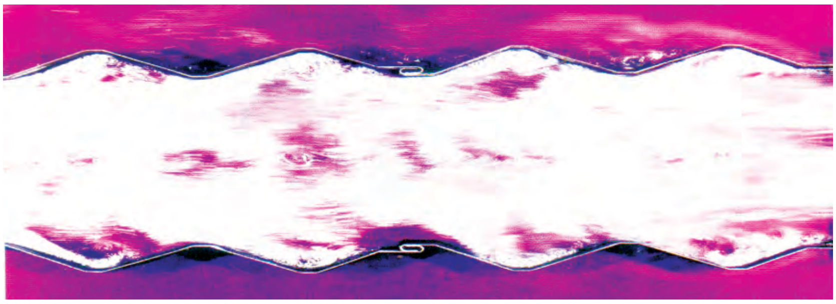
Conditioning with acid gases such as SO_3, basic gases such as NH_3, or water vapor, causes a decrease of the dust resistivity without appearable reduction of the gas temperature. Mixing with gas containing a low resistivity dust has the same effect.

The distance between discharge and collecting electrodes has been increased gradually since the advent of electrostatic precipitator technology. The results of research work carried out in recent years show that within broad limits, a relationship between drift velocity and discharge gap exists. For the arrangement of the V T CORP Emitron-Electrode relative to the collecting electrode actual results are available which confirm the above mentioned relationship for investment costs, Large discharge gaps have a beneficial influence on the precipitator performance.

For Example :

- The number of mechanically operated parts decreases with an increased discharge gap
- The tolerance with regard to the discharge gap can be increased in absolute figures.
- The accessibility to the electrical fields is improved.

- The low clean gas dust contents with are nowadays universally required can safely be achieved with electrostatic precipitators. Often it has been proved that the additional investment costs, to provide lower dust contents in cleaned gases to satisfy future requirements, have not been excessive.



Optimum distribution of the electric field with correctly aligned VT CORP discharge and collecting electrodes.

Dry-type Horizontal Precipitator

High-voltage DC is supplied to the discharge electrodes via the discharge frame suspension system.

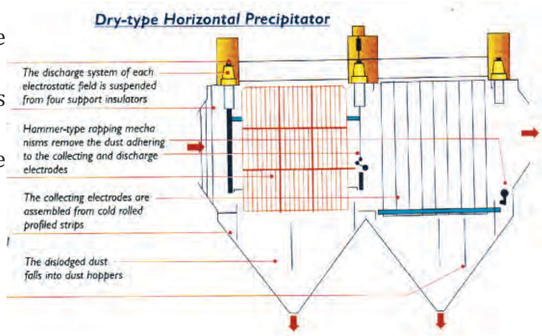
Gas distribution plates in the precipitator inlet ensure even gas distribution over the precipitator cross section.

The discharge electrodes are firmly fixed in rigid discharge frames.

Gas-tight precipitator casing to

accommodate the internal equipment

Gas defector plates prevent by-pass flows

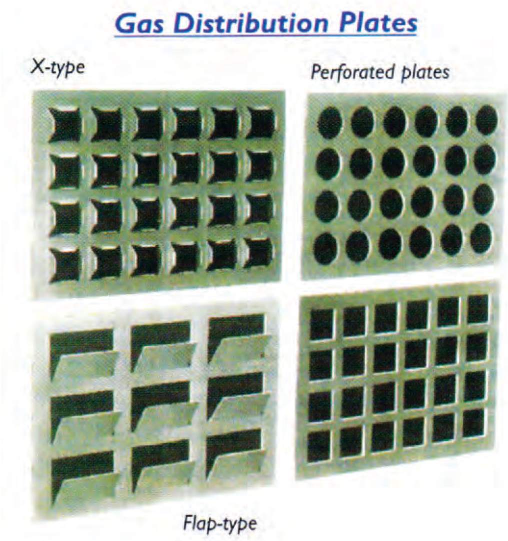


GAS DISTRIBUTION DEVICES

The gas inlet and outlet evases from an integral part of the VT CORP housing. They are made up of mild steel plates and are suitably stiffened with steel sections, designed to withstand design pressure and temperature.

With a view of ensuring an even distribution of the incoming gas flow throughout the cross-section of the precipitator and to reduce the overall pressure loss to optimum level, we provide three walls of specially punched plates at the intel cone of the Precipitator. These gas distribution walls are equipped with rapping device.

The shape of the inlet and outlet evases (cones) as well as the shape of the gas distribution walls have been determined and standardized on the basis of many flow measurement tests.



Due to the ample experience gathered, we are in a position to propose the optimum route of the flue gas ducts and adequately design and arrange required gas baffle plates / diversion plates without carrying out new model flow test.

PRECIPITATOR CASING

The precipitator Casing is of gas tight welded design, and is made up of mild steel with sectional stiffeners. The VT CORP casing and interconnecting ducting are designed to withstand design temperature and pressure.

The loads from the discharge and collecting electrodes are taken up by accessible box-type roof beams and are transferred to the lower supporting walls via the vertical columns made from sectional steel.

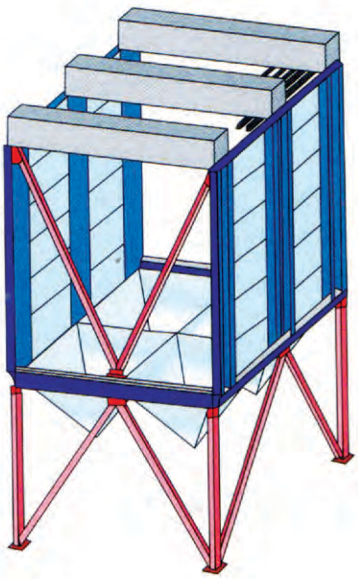
The supporting walls are placed on supporting structures made from sectional steel which consists of a system of fixed and movable supports. They permit compensation of the thermal expansion of the casings.

The gas tight roof lies on top of the collecting electrode supports. The accessible and walkable rain roof cover is on top of tight roof cover.

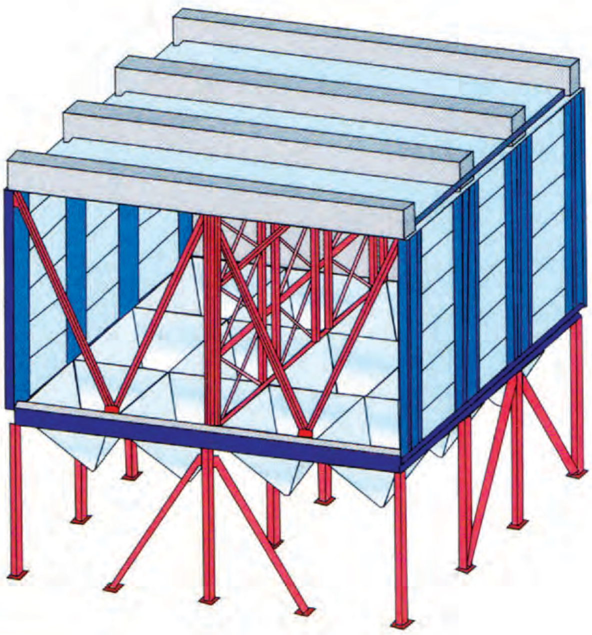
Each precipitator is equipped with hoppers under the fields. The hoppers are made from mild steel plate provided with sectional stiffeners.

At the begining and at the end of each field a catwalk is arranged in the Precipitator casing which permits checking and servicng of the internal equipment. These catwalks can be reached through access doors arranged on one langitudinal wall at the service platform. One stair-case leads from ground level to the service platform and then on the Precipitator roof.

On the roof level at the middle of each of the precipitators, high voltage transformer-rectifier sets are supported on sectional beams.

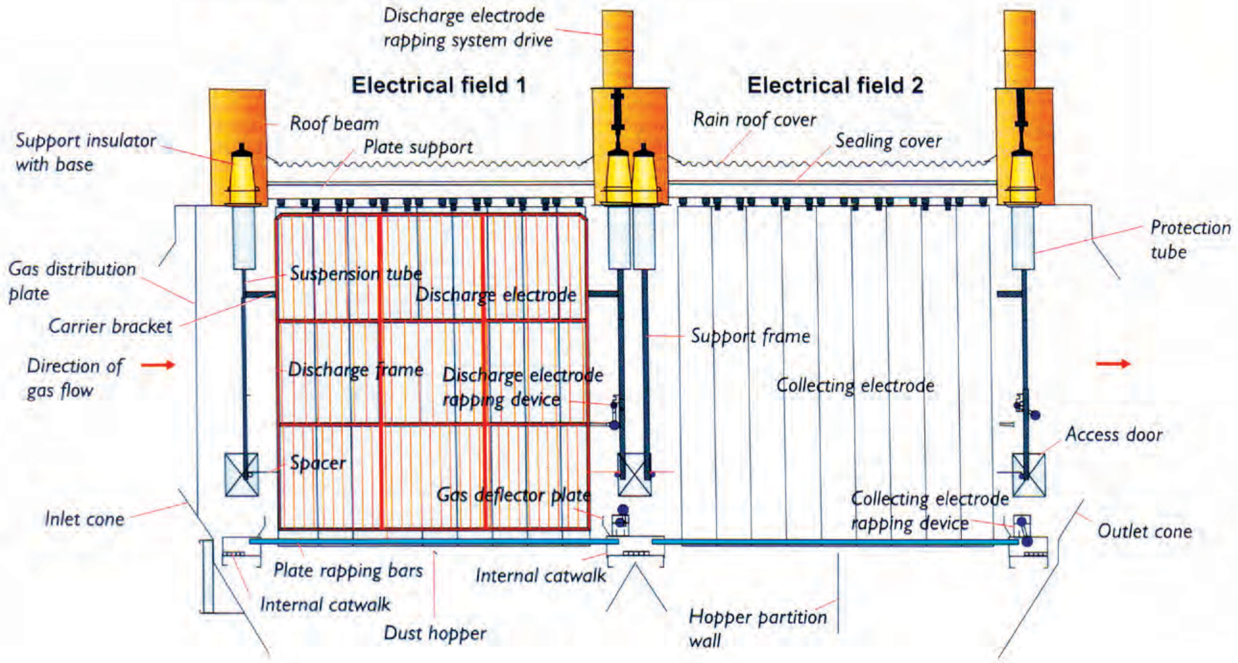


Frame-designing Casing



For installation and removal of the transformer-rectifier sets, runway beam is provided which is equipped with its own permanently installed, manually operated hoist.

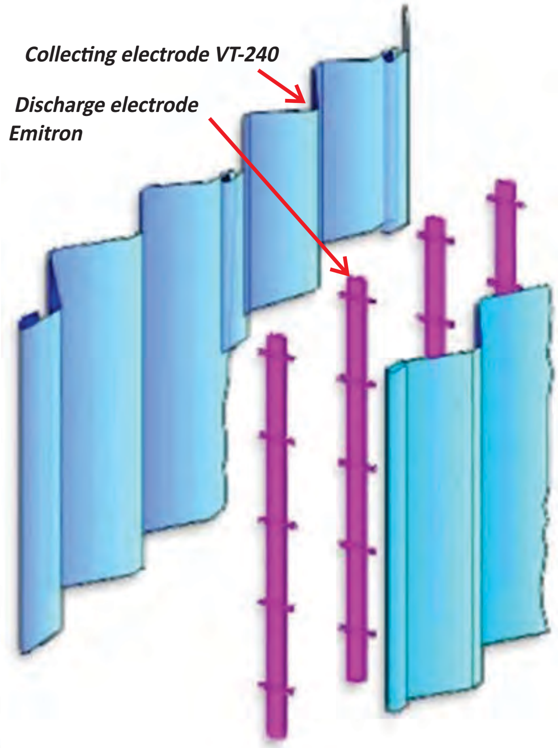
Longitudinal Section Through an Electrostatic Precipitator



ELECTRODE SYSTEM

- Collecting Electrodes Type VT-240

The collecting electrodes consist of individually rolled strips. Their shape, which can be seen in the Sketch, has been developed on the basis of principle of flow and vibration engineering. It ensures a good retaining capacity and setting effect and meets the special requirements of the electrostatic field. The shape of these electrodes ensures that they are sufficiently rigid so as to avoid tilting and deformation which may reduce the field intensity of an entire precipitator section. Collecting elecrode sections are fixed, at their upper end, in a supporting profile and, at their bottom end, they are firmly held in a pair of rapping bars.



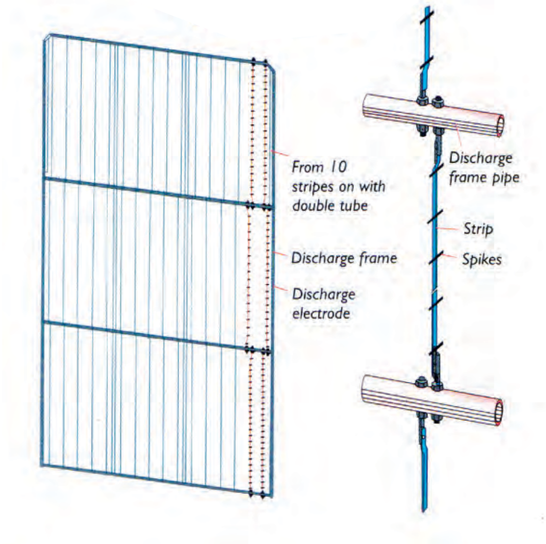
The collecting electrode form rows of plates, lined up in the direction of the gas stream so that the casing is divided into individual passages. The profile of the electrodes and their type of fixing, i.e. a tight suspension, produce, upon rapping all over the surface, a vibration of very high intensity resulting high acceleration perpendicular to the electrode which guarantees a good cleaning effect.

DISCHARGE ELECTRODES

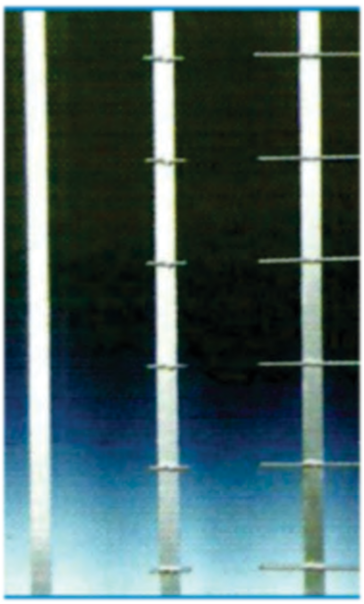
Discharge electrodes type 'Emitron-15' in the first field and 'Emitron-0' in second field to achieve an optimal current/voltage characteristic. The discharge electrode strips are fastened to strong tubular frames in a way to exclude any mechanical wear as well as spark erosion. The shape of the discharge electrodes and their type of fastening to the tubular frames can be seen from the Sketch. The tubular frames are firmly suspended to avoid swinging. In case of considerable field heights, there will be two separate frames arranged one above the other.

TYPES OF DISCHARGE ELECTRODES

Discharge Electrodes with Discharge Frame



Emitron



Star Electrode

- Intense corona generation throughout the length properties among various types of Rigid Electrode.
- Mechanically stable electrodes for optimum rapping vibration transmission and effective dislodgement.
- Light weight, ease of handling at site.
- Durability and Long life

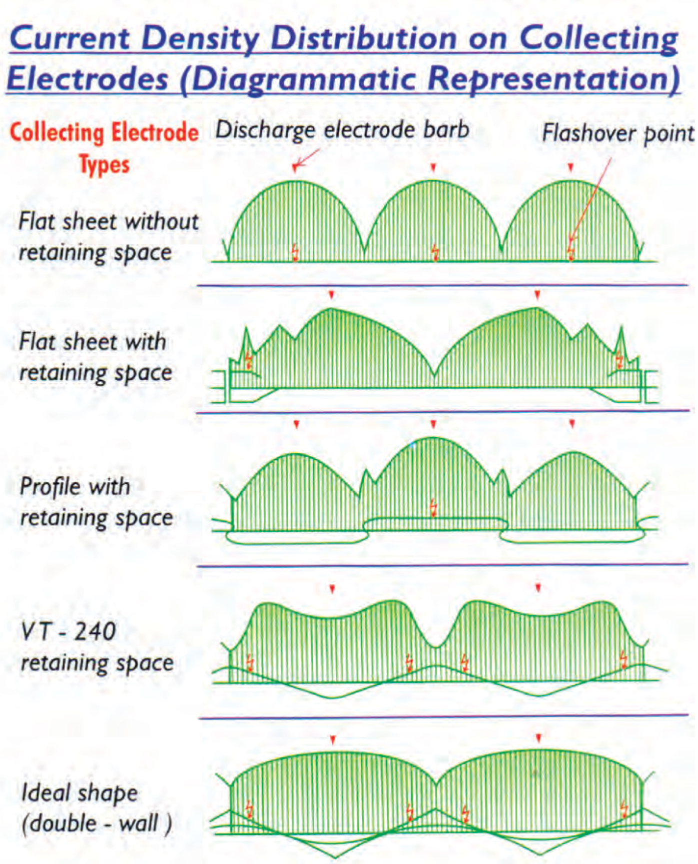
Optimisation of the Discharge and Collecting System.

It was proved that, even in large-scale plants, effective migration velocity increases proportionately to passage width, but only the condition that the same specific discharge current is reached when the maximum applicable voltage the sparkover voltage is applied, Since the discharge current density depends on the ratio of discharge electrode clearance to passage width, the discharge electrode wire spacing is also enlarged.

In general an optimum increase in migration velocity by means of large passage widths may only be achieved if the configuration of the discharge and collecting electrodes is adapted accordingly.

The homogeneity of the electrical field has a decisive effect on the level of voltage which may be attained. In this respect, a tube precipitator is ideal, since the lines of force radiate outwards completely symmetrically ensuring a uniform current distribution.

In case of passage-forming collection plates, this situation is not so easy to bring about, as other criteria have also to be observed. For example Lateral rigidity, profile rolling, stacking and erection simplicity, resistance to rapping stress, vibration properties and also dust retention capacity to avoid dust re-entrainment.

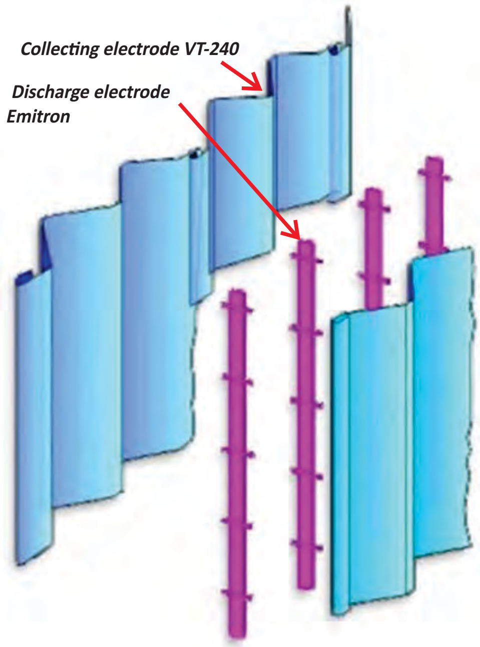


An electrode arrangement developed recently for the wider passage width is shown in the Sketch. With the discharge elements arranged in the middle, the VT-240 electrodes come close to providing the ideal conditions of a tube precipitator due to the approximately semi-cylindrical form of the plates.

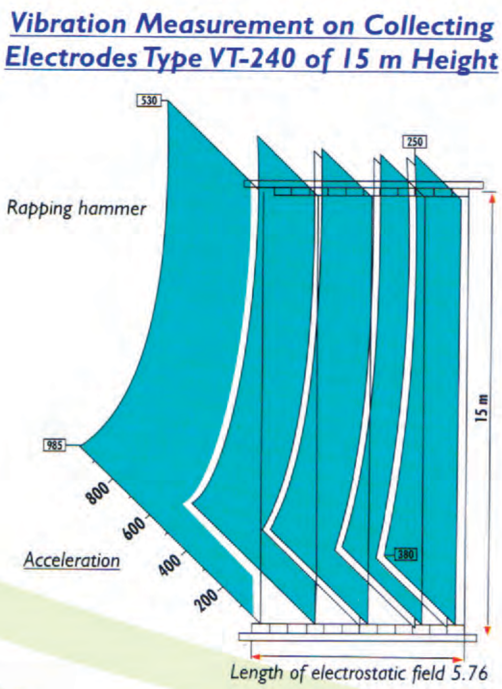
The obtaining of a high flashover voltage is conditional upon an even distribution of the current density over the electrode surface. This fact must be taken into consideration when determining the electrode profile. Sharp and projecting edges which reduce the flashover voltage have to be avoided.

By providing dead spaces, re-entrainment of dust into the gas stream during rapping is prevented. Good vibration properties for easy dislodging of the dust from the electrode surface, sufficient rigidity even with large field heights, together with simple and economical manufacture are further essential requirements for modern electrodes.

The new VT-240 electrode provides an optimum combination of these properties Uniform current density can be assured if the distance between any point on the electrode surface and the discharge electrode is the same.



The ideal collecting electrode would therefore consist of semicircular arcs with the discharge electrode placed in the centre. This arrangement, however, cannot be economically realized in a horizontal precipitator. In case of the VT - 240 electrode, the semicircular arc form was therefore modified to a trapezoidal form. Tests Carried out in laboratory have shown that a uniform current density distribution Is achieved by means of this profile. Since local voltage peaks are avoided, maximum flash over voltages are attainable.



Here again the harmonizing of the necessary minimum vibration intensity and the allowable mechanical stresses of the rapping blow requires a detailed knowledge of these dynamic correlations.

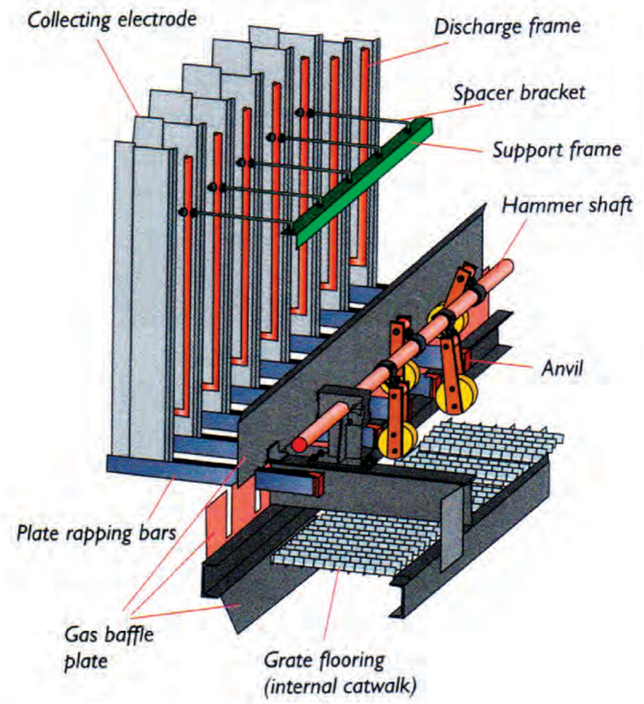
The results of vibration measurement carried out on a VT-240 collecting electrode wall of 15 m height and 5.76 m width. At the critical point, diagonally opposite the point of impact, the values are 250 g (acceleration due to gravity) which is far more than the value of 100 g required for dislodging the dust.

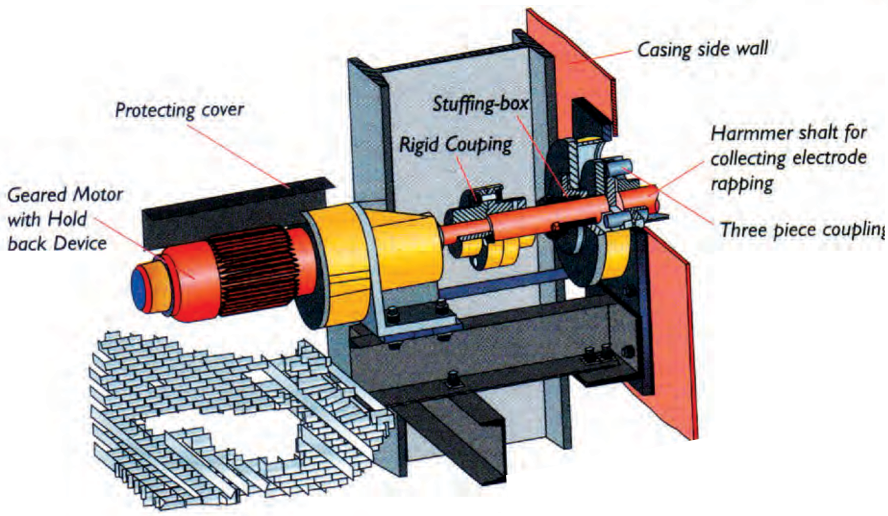
RAPPING MECHANISM

Rapping Mechanism for Collection Electrode System

The Plate rapping mechanism comprises of shafts which are arranged across the direction of the gas flow at the end of each electrostatic field and which carry hammers for rapping each row of plates. When the shaft is rotating, the hammers fall successively on the rapping bars of the respective plate rows. Since the plates are firmly fixed to the rapping bars, the vibrations are transfered with a minimum of loss. This design keeps wear and tear at the lowest level and ensures a uniform and efficient distribution of the vibrations over the entire plate surface.

Rapping System





Collecting Electrode Rapping Mechanism Drive Arrgt

The diagrammatic sketch shows the basic design features of the rapping mechanism. The shafts are supported in dust-proof roller bearing, which reduce wear to a minimum. Each electrostatic field is rapped separately. The rapping cycles can be adjusted by means of a rapping cycle controller to suit the particular gas and dust conditions.

The shafts are driven by means of geared motors. The shaft blushing in the wall of the casing is sealed by means of stuffing boxes.

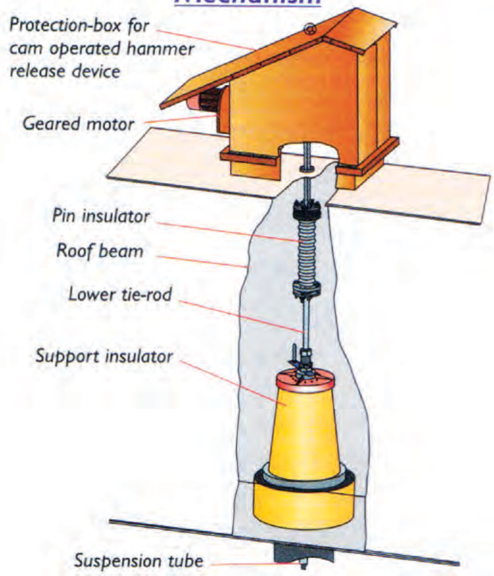
Rapping Mechanism for Discharge Electrode System

The rapping of the discharge electrodes which are fitted into tubular frames is also effected by means of hammers which are mounted on shafts. The hammers are lifted upto an adjustable height by means of the cam release mechanism and fall against the anvils mounted on the discharge frames on release of the lifting device.

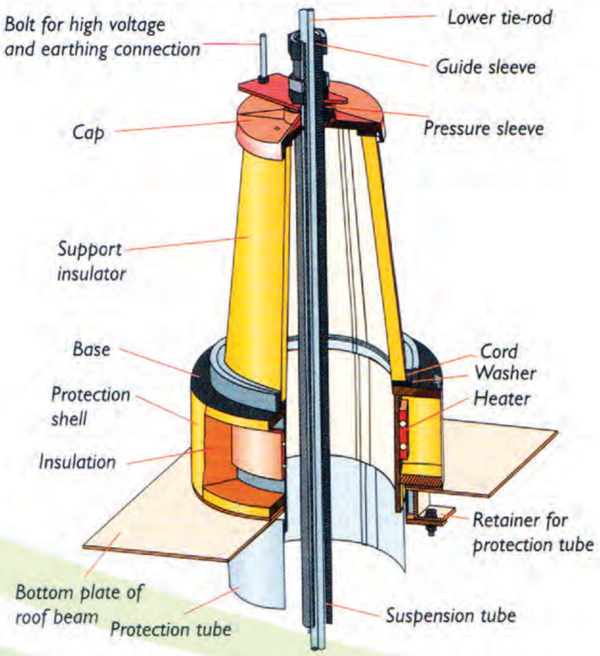
Each of the electrostatic field is fitted with Cam release mechanism which is arranged on the roof beam and are driven by geared motor. The driving and release mechanism is accessible during precipitator operation and the rapping intensity can be continuosuly adjusted from outside. At all bearing points, this system is supported on antifrication bearings, so that no wear can occur.

Porcelain support insulators are provided for supporting and insulating the system electrically. These insulators are insensitive to high temperatures and temperature fluctuations. The insulators are electrically heated so that the high voltage can be switched on at an early stage in case of a cold startup of the plant.

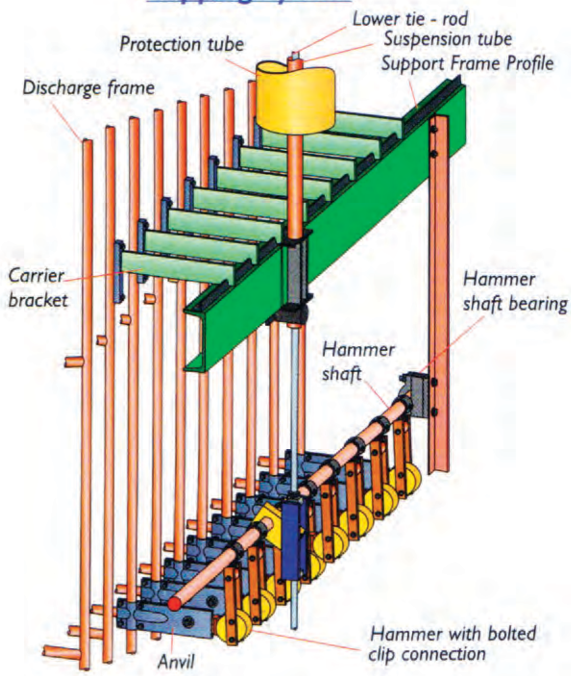
Discharge Electrodes Rapping Mechanism



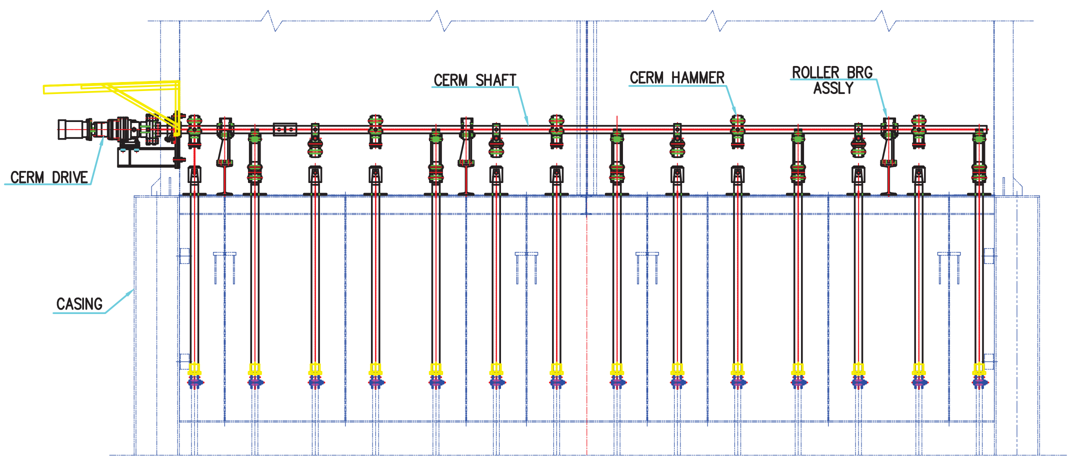
Support Insulator Arrangement



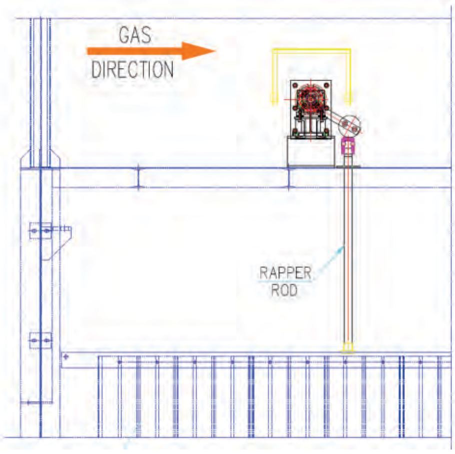
Rapping System



The collecting electrode RAPPING mechanism is mounted on the top, outside the flue gas path.



TYPICAL VIEW



Advantages Of Vtc -tumbling Hammer Rappers At Top

- Compact model and no moving parts in the flue gas path
- Less footprint area
- Less wear and tear
- Easy maintenance and easy to install at site.
- Minimum erection time.

TRANSFORMER RECTIFIER SETS

Each Electrostatic Precipitator is supplied with high voltage direct current from single phase transformer rectifier sets. Each field is supplied by one high-voltage set, feeding to independent group of discharge electrodes. The high-voltage rectifier sets are placed on the Precipitator Roof.

The high-voltage DC is fed from the rectifier sets into the insulator compartment of the Precipitator casing via one earthing/isolating switch per transformer-rectifier set and Bus bar made-up of rigid metal tubes and adequately protected against accidental contacts.

High voltage disconnection switch is provided between T/R sets and ESP H.V. Internals. With the manually operated switch, it will be possible to isolate any one H.V. section of the ESP and at the same time to ground positively that particular H.V. Section.

The design of the transformer-rectifier sets is in accordance with the latest technical standards. The fully automatic control is thyristorised and operates entirely without contacts, enabling the operating voltage to be kept immediately below the spark-over voltage so that an optimum precipitator operation is ensured. Each transformer/rectifier set has its own control cubicle contatining the required control and monitoring apparatus.

The cubicle houses measuring instruments for current and voltage measuring on the primary side and the secondary side. Remote measuring as well as remote connection and disconnection are possible. The switch cubicles should be accommodated in building where the ambient temperature must not be in excess of 25^0 C

Microprocessor Based HVR Controllers

Microprocessor based HVR Control system offers advantages over the control system used in the past in that it has a quicker and differentiated response to changes in the prevailing electrical conditions in the precipitator.

EARTHING AND SHIELDING

A complete earthing system of loop type with double path to the ground for all equipment and ESP structure should be provided. Each casing should have two earthing pads located on diagonally opposite corners of each casing.

Manual Safety grounding and isolating switches are provided so that individual electrical field may be earthed while being serviced. All access doors, gas distribution battles or perforated plates located in the intel cone of the precipitator shall have ground straps connected to the precipitator casing.

SAFETY INTERLOCKS

Safety Interlocks is fool proof manual key sequence type interlock system for the safety of operating personnel from contacting energized high voltage equipment. Key interlocks shall be provided such that for a particular ESP casing any TR set cannot be energized until all insulator housing compartments, manholes and casing inspection doors are locked and emitting and collecting electrode rapping motors are prevented from energisation. Also it shall prevent opening of any inspection door unless all TR sets of that steam are de-energised and all HV disconnection switches are opened to earthed position. Rapping motors operation shall be prevented under this condition unless interlock is specifically defeated for testing.

M.C.C.

A set of completely independent M.C.C. Control Panel is envisaged for each Precipitator.
These cabinates contain the switchgear, monitoring and operating equipment for the equipment and are fully wired, free standing and ready for installation. There will be connection facilities for remote operation and remote signalization.

Thermal Insulation and Metallic Cladding

The insulation material and Metallic Sheet Cladding is Provided to insulate the ESP.

Quality & Excellence Certificates

Our Satisfied Clients

SWASTIK ISPAT PRIVATE LIMITED
MANUFACTURERS : HIGH QUALITY SPONGE IRON
Regd. Office : Plant Site Road, Rourkela - 769 001, Odisha
Ph. No. : (0661) 3209760
Fax : 0661-2402210
E-mail : swastik_ispat@rediffmail.com
Works : Naikinbahal P.O. : Kuarmunda Dist. Sundargarh Mob. No. : 09437502463
28/06/2013

MAHAMANAV ISPAT PRIVATE LIMITED
Date: 10-12-2013

forbesvyncke

Shri Saikrupa Sugar
Date: 10/02/2012

bajaj energy private limited

SHREE DURGA SYNTEX PVT. LTD.
Date: 24th Oct 2015
TO WHOMSOEVER IT MAY CONCERN

ThyssenKrupp

HEG

SKS ISPAT AND POWER LIMITED
Date: 07-11-2011

TATA

Date: 20/03/2015

To whomsoever it may concern

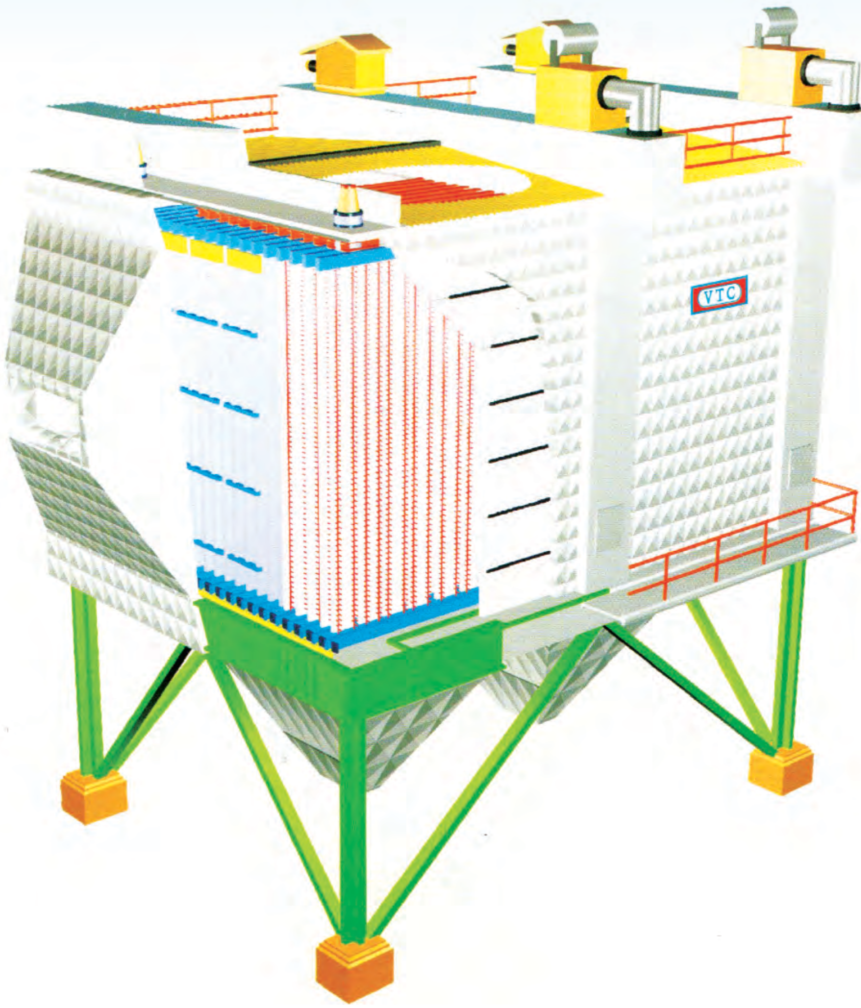
M/s VT CORP PVT LTD. have carried out Retrofitting of ESP by replacing the Internals of one stream out of four stream size: 4(1x4-258,6-68x14x22-300) for our Unit 5 (500Mw), at Trombay Thermal Power Station. The ESP was successfully commissioned on 28th JAN 2015. Performance of the ESP is quite satisfactory and the outlet emission measured was in the range of 20Mg/NM3 to 25Mg/NM3.

We appreciate M/s VT Corp for carrying out replacement of ESP internals successfully and have met our expectation.

(P. L. Manjrekar)
Chief – Trombay Thermal Power Plant

TATA POWER

SGS
TEST REPORT
Report No.: CA:GL:1120002585
Date: 16.02.2010
SAMPLE DESCRIPTION: FLUE GAS (PG TEST)
COMPANY NAME ADDRESS: M/S. V.T.CORP
SAMPLE DRAWN BY SGS INDIA PRIVATE LTD.



Vision To Clean

ISO 9001 2015

Corporate Office:
901, Windfall, Sahar Plaza Complex,
J.B. Nagar, Andheri (East), Mumbai - 400059,
Maharashtra, India.
☎ 022-61081200 / 201-232
✆ 99876 16777
✉ vtcsalescoordinator@vtcorp.in
🌐 www.vtcorpindia.com

Factory address:
Plot no 14,
Mira Co-operative Industrial Estate,
Western Express Hwy,
Kashimira, Mira Road,
Maharashtra 401104

Contact Person
Mr. Raj Chauhan – Business Head Enviro Division
✆ +91 7738336722
✉ raj.chauhan@vtcorp.in

Follow us on