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Envirotherm GmbH, Germany  
(Holder of Lurgi Technology)



AIR POLLUTION  
CONTROL EQUIPMENT

# ESP

(Electrostatic Precipitators)

*180 MW, Unit IV, Coal Based Complete Power Plant  
for OPG Power, Tamil Nadu, India.*



ENGINEERING FOR EXCELLENCE



Isgec Heavy Engineering Ltd. is an established leader in the field of engineering with vast experience - 210 Sugar / Distillery / Refinery Projects, 850+ Boilers and 50+ Power Plants across 49 Countries.

Isgec, under exclusive license agreement with Envirotherm GmbH, Germany, offers customers in India internationally acclaimed solutions in Electrostatic Precipitators.

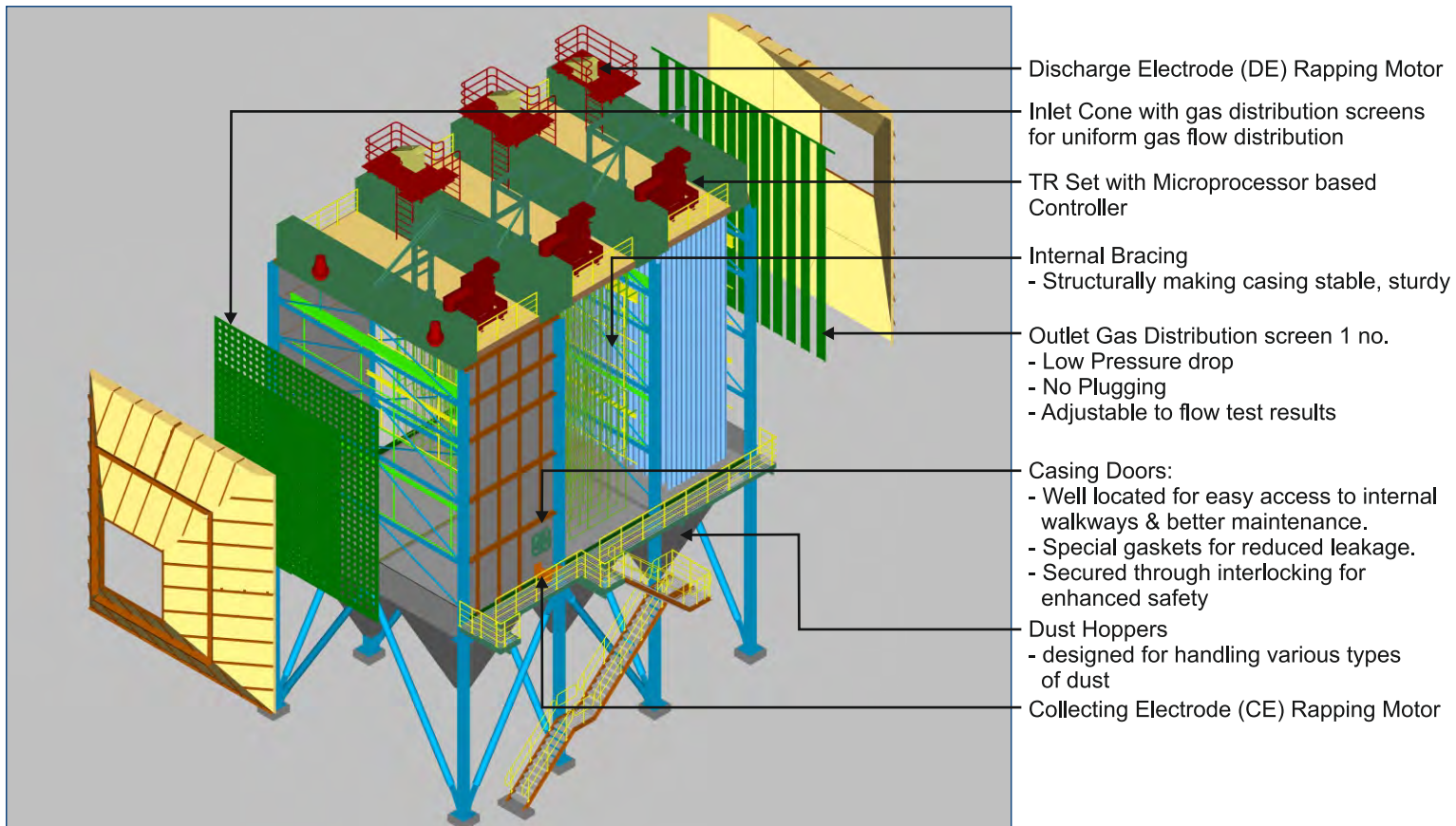
These include unique technologies that have been successfully tested by Envirotherm, across projects set up by them around the world.

**ENVIROTHERM GmbH**  
Germany

(Holder of Lurgi ESP Technology)

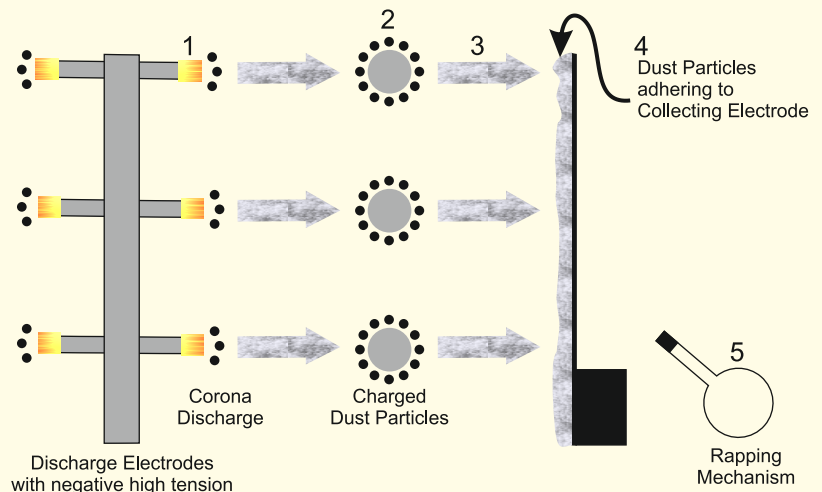
**Exclusive License & Cooperation Agreement for Design, Engineering, Manufacturing and Commissioning of ESPs up to 1000 Mw<sub>el</sub>**

## Electrostatic Precipitator with advanced Lurgi design - ZT 24 CE & Variodyn DE configurations



### Principle of Operation

1. Ionization - Charging of the particulate matter / dust particles with the help of uniform corona discharge through Variodyn discharge electrodes, placed perpendicular to gas flow.
2. Charging of dust particle
  - Diffusion charging for particles < 0.5 μm
  - Field charging for particles > 0.5 μm
3. Migration of the charged particles towards (aerodynamically shaped) ZT 24 profile type collecting plates.
4. Dust collection / dust agglomeration on ZT 24 profile type collecting plates.
5. Tumbling hammer rapping provides effective dust removal / dislodging from ZT 24 profile type collecting plates.





## Major Components: Discharge electrodes • Collecting electrodes

### Advantages of Discharge Electrodes

Effective charging of particulate matter due to perpendicular placement of Variodyn pins to gas flow.

Uniform corona discharge covering entire cross section due to symmetrical placement of spikes.

Better collection efficiency.

Strong and sturdy design due to bolting / welding in a rigid frame assembly.

Ideal for Indian Coal Ash, having high ash content.

A few of the application-dependent pin configurations Variodyn 0, Variodyn 15, Variodyn 25, Variodyn 40

### Advantages of Collecting Electrodes

Optimized & uniform current profile.

Optimized / maximum secondary voltage.

Better transmission of rapping forces across the width & height of collecting plate.

Good strength / rigidity.

Improved collection efficiency.

Close to theoretical ideal profile with regard to current density distribution.

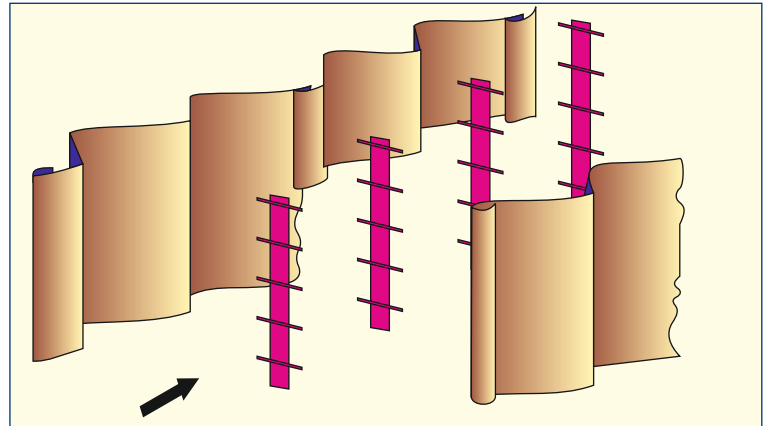


Discharge Frame with VARIODYN 15 Electrodes

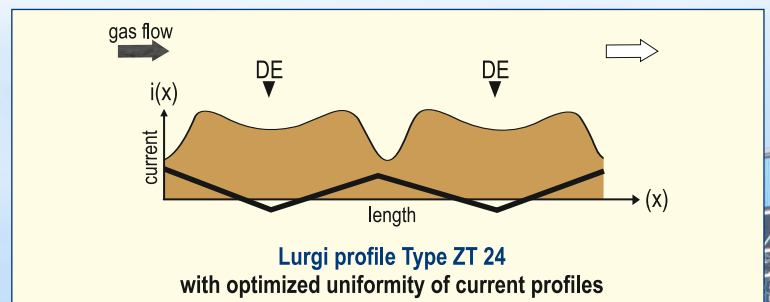


View of VARIODYN 15 Electrode

### ZT 24 / VARIODYN 15



### Current Density Distribution



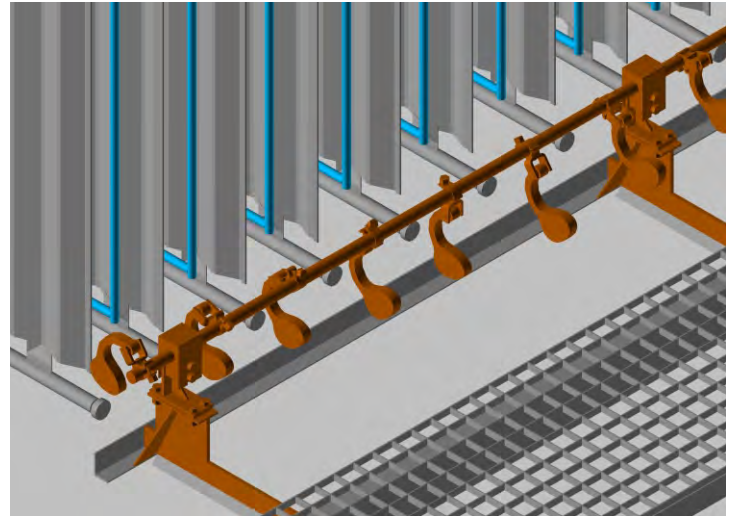
Panoramic View of 180 MW, Unit IV, Coal Based Complete Power Plant for OPG Power, Tamil Nadu, India





## Advantages of Bottom Rapping on Collecting Electrodes

- Each row of collecting electrode rapped independently - less re-entrainment of dust.
- Uniform distribution of high rapping acceleration resulting in effective dust removal from the entire surface area of individual collecting plate.
- Easy maintenance & trouble free operation as placed adjacent to walkway / catwalk.
- Less number of moving parts.

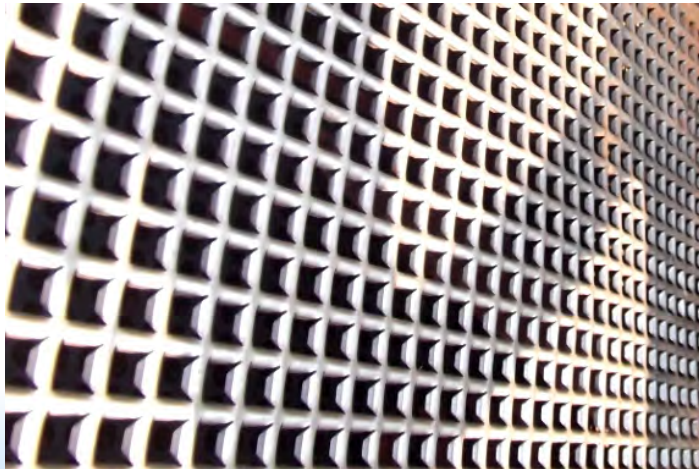


Collecting Electrode Rapping

## Improved Flow Distribution

### Customized Gas Distribution (GD) Screen combinations for even gas flow distribution

GD Screens - 'X' Type / Circular / Combination of 'X' Type & Circular holes • In house CFD (Computational Fluid Dynamics)

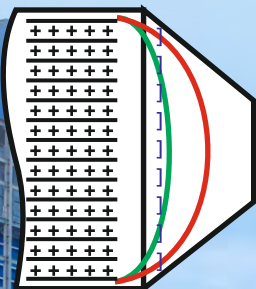


'X' type holes GD Screen



Circular holes GD Screen

## Benefits of Outlet GD screen with 'U' / Plate-Type Baffles



Red Distribution without "U"- Baffles

Green Distribution with "U"- Baffles

- Uniform Gas Flow Distribution through Gas Passages - for high dust collection.
- Low Pressure Drop resulting in lower power consumption.
- Easy Adjustment based on CFD analysis to minimize downtime.
- No plugging & cleaning required.
- No wear & tear.







## Prestigious Customers

Customers	No. of Units	Boiler Capacity	Types of Boiler	Fuels
OPG Power Generation Pvt. Ltd., Tamil Nadu	1	180 MW	Pulverised Coal	Indian Coal / Indonesian Coal
Nirma Ltd., Bhavnagar, Gujarat	1	100 MW	CFBC	Imported Coal / Indonesian Coal / South African Coal
Shriram Alkali & Chemicals Ltd., Gujarat	1	75 MW	CFBC	Lignite / Petcoke / Indonesian Coal South African Coal
Bhubaneswar Power Pvt. Ltd., Orissa	2	67.5 MW	CFBC	Washery Rejects / Indian Coal
Generadora Chinchontepec, S.A.DE C.V, El Salvador, South America	1	52 MW	Travelling Grate	Bagasse
Spectrum Coal and Power Pvt. Ltd., Chhattisgarh	1	53 MW	Travelling Grate	Worst Coal
Cosumar, Casablanca, Morocco	2	50 MW	Travelling Grate	Imported Coal
Casur, Nicaragua, North America	1	42.5 MW	Travelling Grate	Bagasse
Narmada Sugars (P) Ltd., Narsingpur, Madhya Pradesh	1	38 MW	Travelling Grate	Bagasse
Superior Food Grains (P) Ltd., Bellary, Uttar Pradesh	1	37 MW	Travelling Grate	Rice Husk + Bagasse
United Phosphorus Ltd., Gujarat	1	35 MW	CFBC	Indian Coal / Imported Coal
DSCL Sugars Limited, Ajbapur, Uttar Pradesh	1	34 MW	Travelling Grate	Bagasse
VNT19 Pulp-Paper Joint Stock Company, Vietnam	1	33.5 MW	CFBC	Vietnam Coal
DSM Sugar, Rajpura, Uttar Pradesh	1	30 MW	Travelling Grate	Indian Coal
Bharathi Cement Pvt. Ltd., Andhra Pradesh	1	30 MW	CFBC	Indian Coal / Petcoke / Indonesian Coal
Vithal Power SSK Ltd., Maharashtra	1	30 MW	Travelling Grate	Bagasse
Consumar, Sidibenour, Morocco	1	27 MW	CFBC	Imported Coal
Green Power Sugars Limited, Satara, Maharashtra	1	25 MW	Travelling Grate	Bagasse & Imported Coal
Gujarat Fluorochemicals Limited, Dahej, Gujarat	1	22 MW	AFBC	Imported Coal
La Grecia, Honduras, South America	1	21 MW	Travelling Grate	Bagasse
Bajaj Hindustan, Uttar Pradesh	1	15 MW	Travelling Grate	Slop / Bagasse
Avadh Sugar, Uttar Pradesh	2	11 & 14 MW	Travelling Grate	Slop / Bagasse
Adani Cutch Copper Ltd., Gujarat	3	0.5 MTPA	FSF/PSC	Copper Smelter Fumes

CFBC - Circulating Fluidised Bed Combustion • AFBC - Atmospheric Fluidised Bed Combustion



30 MW Coal based Power Plant  
at Bharathi Cement Corp. Pvt. Ltd., Andhra Pradesh



35 MW CFBC Power Plant  
at United Phosphorus Ltd., Gujarat



67.5 MW CFBC Power Plant  
at Bhubaneswar Power Pvt. Ltd., Bhubaneswar



22 MW AFBC Power Plant  
at Gujarat Fluorochemicals Dahej, Gujarat

## Isgec Offerings

### STEAM GENERATORS

- Pulverised Coal Fired (PC)
- Circulating Fluidised Bed Combustion (CFBC)
- Atmospheric Fluidised Bed Combustion (AFBC)
- Travelling / Pulsating / Pinhole / Dumping Grate
- Oil & Gas Fired
- Heat Recovery Steam Generators
- Waste to Energy
- Waste Heat Recovery
- Slop / Spent Wash / Vinasse Fired

### AUXILIARY EQUIPMENT \*

- Air Pollution Controller (ESP)
- Deaerator / Fans
- Valves
- Electricals & Instrumentations
- Burner
- Bed Ash Coolers
- DCS
- Feeders
- Pumps

### STEAM GENERATOR SERVICES

- Site Construction & Commissioning
- Retrofitting and Modernisation
- Replacement / Upgradation of Parts
- Troubleshooting & Services
- Residual Life Assessment (RLA) Studies
- Training
- Spares
- Operation & Maintenance

### EPC PROJECTS

- Independent Power Plants
- Cogeneration Plants
- Sugar Plants
- Material Handling
- Water Treatment Plants
- Distilleries

\* Only available with the Boiler

**Feed Cycle Equipment (HP Heater, LP Heater & Condenser)**  
**Process Equipment • Presses • Castings • Contract Manufacturing**



**ISGEC HEAVY  
ENGINEERING LTD.**

CIN: L23423HR1933PLC000097

A-4, Sector 24, Noida - 201 301 India

Tel.: +91-120-484 7010 Fax: +91-120-408 50 00

India Contact: Raghunath Srinivasan E-mail: raghunath@isgec.co.in, apce.proposal@isgec.co.in

Exports Contact: Yogesh Marwaha, E-mail: exports@isgec.co.in

[www.isgec.com](http://www.isgec.com)