THE THERMAX ENVIRO PORTFOLIO

Air pollution control
- Baghouses - Reverse Air, Pulse Jet & Insertables
- Electrostatic Precipitators - Dry and Wet
- Particulate Scrubbers - Venturi, Cyclonic
- Gaseous Scrubbers - Packed Bed, Spray/Tray Towers
- Flue Gas Desulphurization (FGD) Systems
- Dedusting & Fume Extraction Systems
- Coal Preparation Plants & Coal Injection Systems
- Pushing Emission Control Systems for Coke Ovens
- Combifilter
- Retrofit and Rebuild
- Spares & Services

The division also undertakes turnkey projects to offer complete technology on air pollution control and its management.

OTHER ESP INSTALLATIONS FOR REFERENCE

On the front cover:
ESP on Biomass fired Boiler in a 9.9 MW unit

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ENVIRO DIVISION

Thermax Business Portfolio
- Heating
- Cooling
- Power Generation
- Air Pollution Control
- Chemicals
- Water and Wastewater Solutions
- Solar
- Specialised Services

Electrostatic Precipitators
With special features to achieve low emissions

Cleaning the air for better returns

www.thermaxglobal.com
Thermax Limited: Improving your Business is our Business

Thermax offers products, systems and solutions in energy and environment engineering to industrial and commercial establishments around the world. Its business expertise covers heating, cooling, waste heat recovery, captive power, water treatment and recycling, air pollution control and waste management and performance chemicals. Thermax brings to customers extensive experience in industrial applications, and expertise through technology partnerships and strategic alliances.

Operating from its headquarters in Pune (western India), Thermax has built an international sales and service network spread over South East Asia, Middle East, Africa, Brazil, UK and US. It has a full fledged manufacturing set up that is certified for ISO 9001:2000, ISO 14001 and safety management according to OHSAS (ISO 18001).

THERMAX ENVIRO DIVISION:
Cleaning the air for better returns

Enviro Division was conceived with the belief that ‘Pollutants are inevitable but pollution is not’. An acknowledged leader in the air pollution control business, it offers a wide range of flange-to-flange products, customised systems and value added services. Enviro is present in most industries and application segments viz cement, iron and steel, power, non-ferrous metallurgical, fertilisers, tyres, paper, chemicals, petrochemicals and textiles.
**ELECTRODES**

**Discharge Electrode**

The Thermax discharge electrode possesses excellent performance characteristics over a wide range of applications.

- Rigid structural matrix
- Precisely manufactured to fit within collecting plate arrangement
- Fabricated from structural tubing, with uniformly spaced corona studs to optimise voltage/current relationship
- Annealed corona studs prevent cracking due to fatigue
- Design configuration minimizes arcing and allows considerably elevated voltage before sparkover occurs.

**Collecting Electrode**

- Accurate plate alignment tolerance
- Structural integrity and superior ability to transmit rapping energy; allows cleaning under all types of service conditions and plate heights
- Pre-formed modules with interlocking edges fit/snap securely together and require no field assembly
- Top and bottom edges reinforced and stiffened by tubular structural members
- Mechanical interlock prevents deformation and oil canning

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**RAPPING SYSTEM**

- **TIGI (Thermax Impulse Gravity Impact Type Rappers)** - Gravity assisted rapping effectively reduces re-intrainment
- Complete rapping mechanism positioned outside gas stream on roof, thus facilitating on-line maintenance
- Provides maximum plate acceleration in excess of 200 Gs
- Electric Single Impulse (ESI) rapper accommodates on-line adjustment of rapping intensity and frequency
- 100% microprocessor backup
- Longer life resulting from less wear and tear
- Uniform distribution of force
- Ideally suited for installations with varying process conditions

**ELECTRICAL COMPONENTS**

**Transformer Rectifier**

- Extra heavy duty design suitable for 120 or 90 KV peak voltage, based on application requirements
- Built-in current limiting reactor to protect the electrical system from frequent short circuits in the field
- Top as well as side output HT bushing
- Pressure release valve to take care of excess pressure in tank

**Control Cabinet**

- Completely automatic transformer rectifier control
- Glow tubes are provided in the field for feedback circuit to ensure protection
- Necessary surge suppressors are provided for noise elimination
- Audio-visual alarm annunciator and time totaliser are provided
- Back-up over current protection is provided
OPTIKLIN: The Thermax Intelligent Microtapper Controller

- Programmable logic control based system for efficient and optimum operation of rappers
- High reliability with improved immunity to noise and adverse electrical supply conditions
- Easily programmable for individual applications
- Excellent LCD touch panel graphic human machine interface incorporating live mimic, alarms, diagnostics, reports and help menus with password protection
- Ensures precise setting of lift, round trip time etc.
- High current, solid state switches used for row and column selection enabling long and trouble-free life
- Rugged power source with built-in safety for maximum current and voltage levels
- Detection of ‘rapper open’ and short-circuit conditions and their annunciation
- Designed for high efficiency, less power loss and less heating of the panel
- Compact panel with lesser components allows easy maintenance
- Easily expandable for larger systems

We also offer conventional tumbling hammer type mechanical rapping system, which may be bottom rapped design.

ANCILLARIES

- A variety of peripheral systems form part of our overall system design and supply capability
- These include conditioning towers, duct work, stacks, fans, screw conveyors, duct valves, bucket elevators, storage silos and supporting steel structures, all of which can be supplied on a turnkey basis
- In-house computerised flow modeling facilities to ensure proper gas distribution in critical cases, typically for high flow rates

APPLICATION AREAS

Cement & Rock Products

- One of the rock products industry’s most highly respected suppliers, low operating and maintenance costs of these ESPs are a result of extensive experience in this industry
- Industry experience covers ESPs for gas cleaning or product recovery from wet and dry process rotary kilns, clinker coolers, dryers and ballmills for raw and finish grinding
- ESPs for other applications in this area include material from kilns processing, alumina, dolomite lime, metallurgical lime and others

Utilities

- Experience in dealing with a multitude of fuels has provided extensive data base to accurately determine most economical design for optimum performance under varying load conditions
- Continuing accumulation of operating data and verification of design assumptions ensure high degree of reliability in precipitator sizing and performance guarantees.

ESP’s on coal fired OFBC boilers in a 2 x 135 MW unit
ESP’s on PC fired boilers in a 2 x 150 MW unit

Captive Power Plants

ESP after 147 TPH, F Grade & Pelcoren fired OFBC Boiler in Captive Power Plant for Cement Industry, India
ESP after 85 TPH, Indonesian coal fired OFBC Boiler in Captive Power Plant for Cement Industry, Yemen
ESP after 43 MW, Captive Power Plant
ESP after Coal & Sludge fired AFBC Boiler
ESP’s after 4X250 TPH OFBC boiler in 4X86.5 MW Power Plant

Four stage suspension preheater kiln precipitator (right) and offal bypass precipitator (left)
ESP on clinker cooler, handling 4,98,000 m³/hr.
**Pulp & Paper**

**Recovery Boiler Precipitators**
- Modern steel casing design features no internal struts, vanes or rapping devices that could lead to dust buildups.
- Design of top or bottom inlet and outlet plenum configurations minimise potential for salt cake buildup.
- The TIGI system, including the heavy gauge T-Line collecting electrode, electric impulserapper, heavy duty transformer rectifiers, state-of-the-art PLC based controls, and heavy duty, dry bottom drag system conveyor, add up to one of the most reliable and preferred recovery boiler precipitator systems in the industry today.

![ESP on recovery boiler in a paper plant](image)

**Steel**
- Thermax ESPs are used in sinter plants to capture fine particulates generated in the mixing and agglomeration of iron ore and other additives for blast furnace feedstock.
- Tars and other particulates in coke oven gases are removed by tubular or concentric ring precipitators, before the gas is recovered and collected for storage as an energy source for coke oven operations. The stored gas is cleaned by a secondary fuel gas precipitator prior to combustion in the ovens. This process removes a majority of the remaining tars and particulate, ensuring proper gas flow through the combustion nozzles in the oven.
- Thermax ESPs are operating in open hearth and basic oxygen shops to remove particulate, before exhaust gases are discharged into the atmosphere.

![Centrifuge collecting electrode for precipitator for 1.8 MTPA Coke Oven](image)

**Sinter Plant**

**Sinter plant waste gas and plant de-dusting**
- Sintering process is a pre-treatment step in the production of iron, where fine particles of iron ore, coke, lime stone and dolomite. In some plants, secondary iron oxide wastes (collected dusts, mill scale), are agglomerated by combustion process. Agglomeration of the fines is necessary to enable the passage of hot gases during subsequent blast furnace operations.
- By leveraging its vast experience in the steel vertical, Thermax has also gained entry in sinter plant applications. With required application knowhow, trustworthy engineering and execution capability, we are successfully running installations in the industry.

![Waste gas ESP on 90 m² sinter grate area](image)

**Pelletisation Plant**
- Iron ore pelletisation and hardening process takes place in the ore mine far from the actual iron and steel making process. The pelletisation plant transforms the iron ore fine powder into hard lumps or balls for easy transportation as direct feed to the blast furnace. The process involves mixing of iron ore and bentonite as binder and fluxes in certain proportions. This is achieved by adding water and rotating in a drum designed to give a spherical shape of approximately 8 to 16 mm size. The pellets thus produced are referred to as "Green Pellet". These pellets are baked in an indurating furnace at approximately 800 - 1000 °C which is high enough to transform them into a semi-molten state. This is then subsequently cooled and discharged as hardened iron pellets.

![Centrifuge collecting electrode for precipitator for 1.8 MTPA Coke Oven](image)

![ESP for 2 x 4.5 MTPA Pellet Plant in Oman](image)
Pelletisation ESP for process gas (wind box & hood exhaust) and plant de-dusting

This process requires high gas flow volume out of wind box under the belt and hood installed above the pellet plant. Two FD fans create the necessary draft required for the indurating machine, and gases are sucked out using wind box ID Fan and hood exhaust ID fan. These dust laden gasses are passed through an ESP before being let out through stack into the atmosphere. The fine dust collected in the ESP is again sent back to the ore preparation plant to be reduced to pellets. This method of producing pellets is referred to as Straight-Grate Process.

Pelletisation ESP for process gas (draft drying & pre-heating) and plant de-dusting (pellet cooler & screening area)

Two or more FD fans pump in ambient air under the cooler beds, and heated air is used to dry green pellets. A series of ID fans, at the outlet, draw in the dust laden air for processing in the ESP before letting it out through the chimney. These are typically referred to as Draft Drying ESP, Pre-Heating ESP, Pellet Cooler ESP. Plant de-dusting is undertaken using a Screening ESP. The process of producing pellet is referred to as Grate-Kiln Process.

Chemicals, Food Industry & Non-Ferrous Metals

- Our extensive process knowledge, vast experience and specialised equipment have helped solve a variety of air pollution, material recovery and gas cleaning problems in chemical processing and non-ferrous metal refining industries.
- Continuous development has resulted in improved designs for various demanding applications e.g. our enclosed tube, balanced pressure acid mist precipitator effectively protects against tube collapse common in exposed tube section types.
- TIGI System precipitators have been used successfully in petroleum refineries to remove catalyst and coke lines from exhaust gases.
- ESPs have been designed and manufactured to handle gases generated from processing copper, zinc, chromium, sodium carbonate, phosphorus pentoxide and calcium fluoride.
- Dry precipitators are used to remove solid particulate from gases containing sulfur oxides. In some applications, these gases are then passed through our tubular lead acid mist units to remove corrosive acids harmful to the equipment and catalysts used in the manufacture of sulfuric acid.

Steel: Other applications

In addition to sponge iron plant, our ESPs are also preferred equipment in sinter plant, pelletisation plant and coke oven plant, stock house and cast house for blast furnace, BOF secondary de-dusting and scarfing machines.