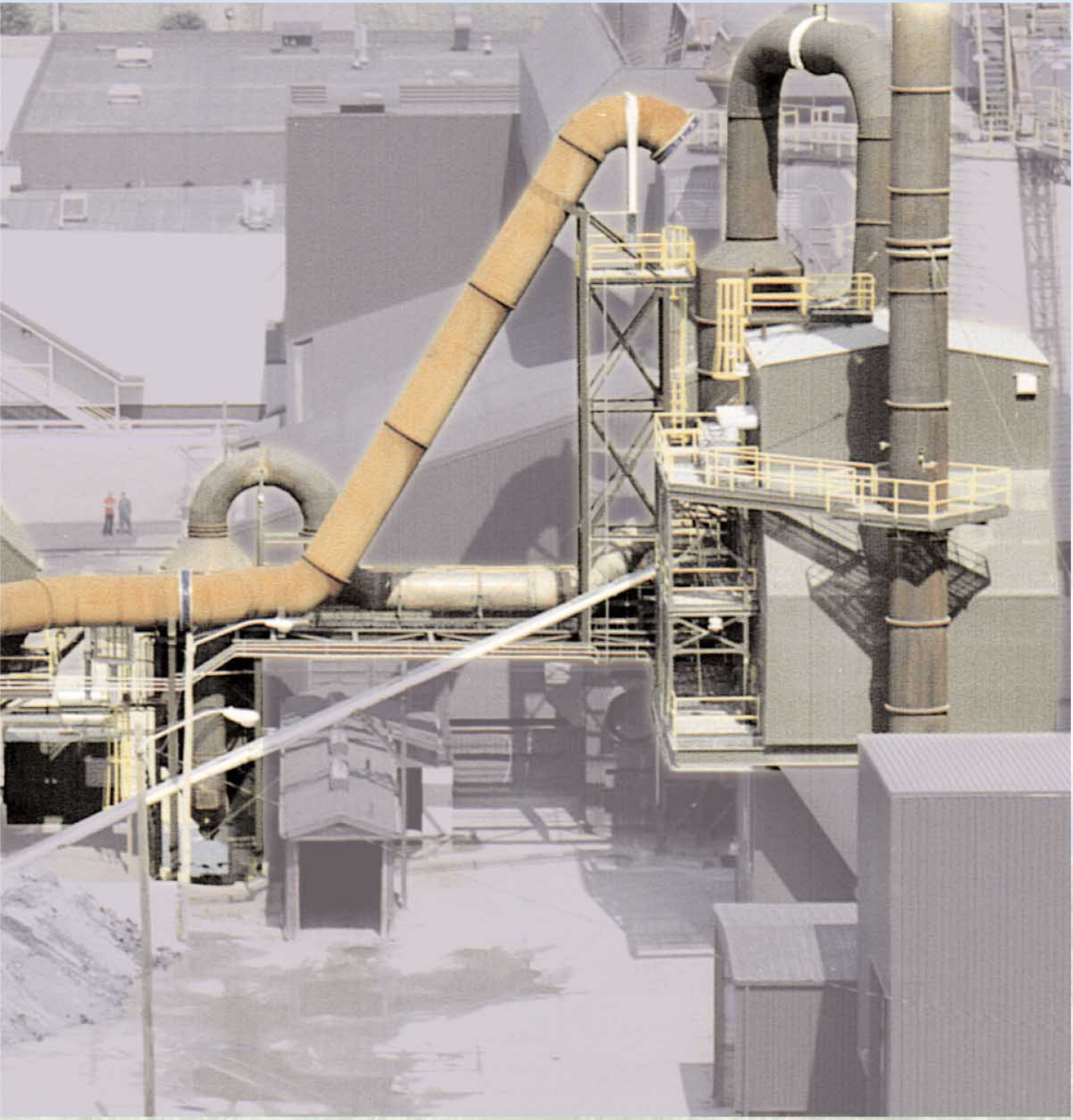
McGill AirClean Corporation

An enterprise of United McGill Corporation—
Founded in 1951

Electrostatic Precipitators

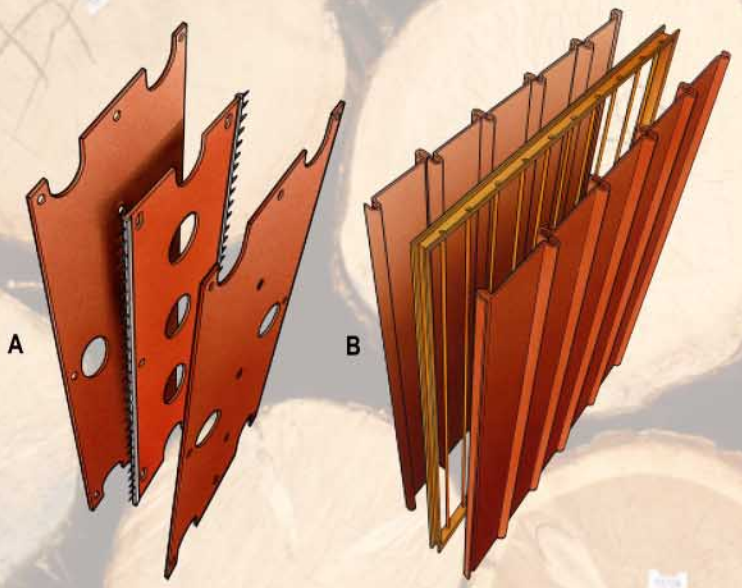


McGill AirClean™ products depicted in this brochure were current at the time of publication. As a quality-conscious manufacturer, McGill AirClean Corporation continually seeks ways to improve its products to better serve its customers. Therefore, all designs, specifications, and product features are subject to change without notice.

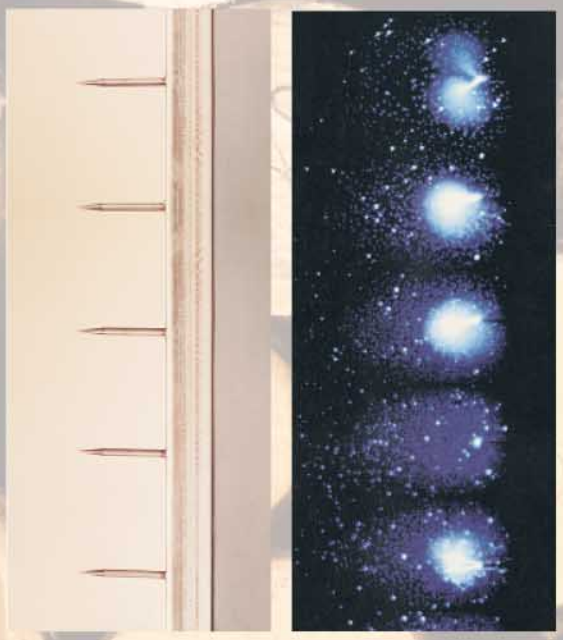
The Company Behind the Products

United McGill, parent company to McGill AirClean, has been in business more than 50 years. And for 40 of those years we've provided reliable and effective air pollution control solutions.

The company was founded and continues to grow by adhering to the principles of providing quality products and personal service. We are proud that our customer base represents companies associated with industry leadership and success.

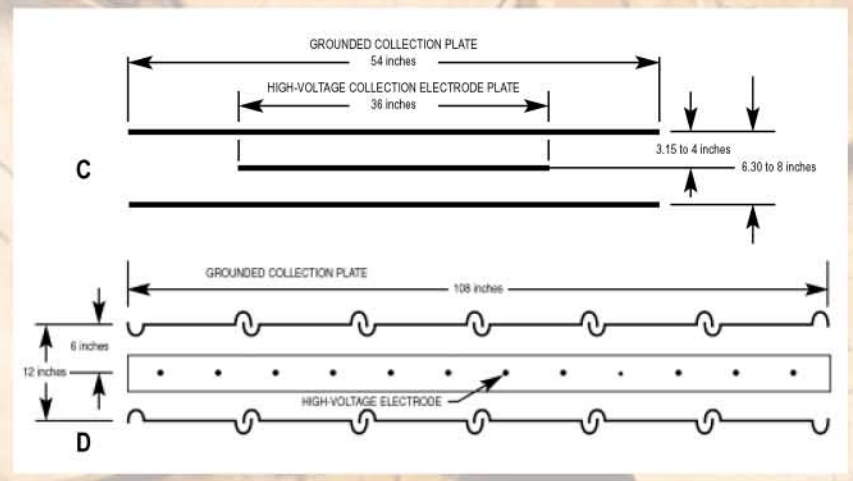


Artist's renderings, approximately to scale, comparing the collection plates of a McGill AirClean EP with its needle/plate design (A) to another type of EP with rigid frame electrodes (B).



A scale view of a section of needle electrodes mounted on the edge of a high-voltage collection electrode plate.

A scale view of the same needle electrodes under normal applied DC voltage. Corona current flows from the needle tips through the gas stream to a resistive layer on the grounded collection electrode.



(C) Plan view of McGill EP electrodes with typical dimensions.

(D) Plan view of the electrodes from another type of EP with typical dimensions.

McGill AirClean Electrostatic Precipitators

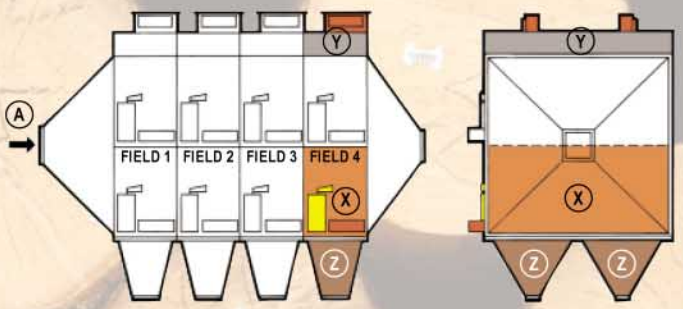
McGill AirClean's electrostatic precipitator (EP) systems provide effective air pollution control for boilers, furnaces, incinerators, and other types of industrial processes. We can design and manufacture an economical system to help you comply with the toughest emissions standards. One of the many things that sets our EPs apart from other designs is a high-voltage needle/plate collection electrode for generating the corona current and electrostatic field. In our EPs, a series of sharp needles are mounted along the leading and trailing edges of high-voltage collection plates. The needles produce an electrical charge that causes particulate in the flue gas stream to collect on the electrode plates. This unique design enables our EPs to combine high collection efficiency with low operating costs, low maintenance costs, and small sizes.

Low Operating Costs

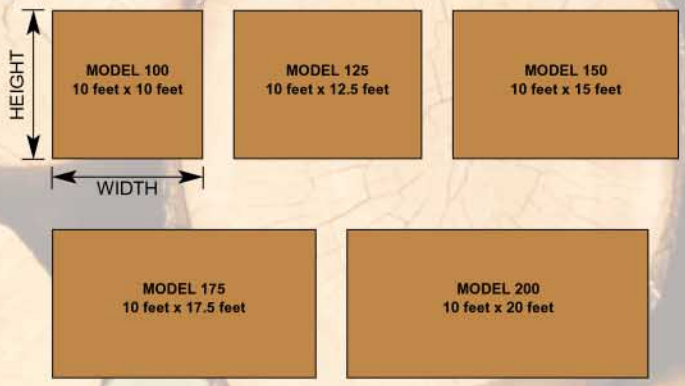
All EPs generate a corona current to electrostatically charge particulate and remove it from the flue gas stream. Conventional EP designs inherently require large amounts of electricity to collect particulate. McGill AirClean's needle/plate collection electrode design uses energy much more efficiently, enabling our EPs to operate at relatively low levels of voltage and current. By consuming as much as 70 percent less power than conventional precipitators (and far less than baghouses or scrubbers), a typical EP can save you tens of thousands of dollars per year in electricity costs.

Low Maintenance Costs

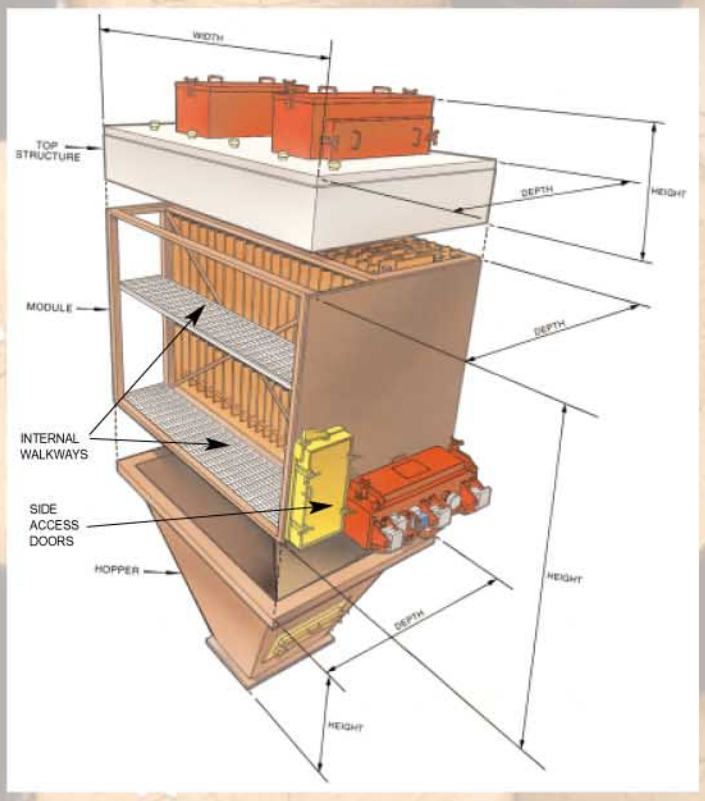
EPs are equipped with rapping systems that periodically clean particulate from the collection surfaces. Because our EPs generate a high average current density, the electrodes do not require the frequent cleaning that conventional corona electrodes need. Less rapping means less wear and tear for the EP internals. The potential for damage to the corona-generating needles is further reduced because of the rigid support provided by the plates. In addition, operating at low voltage and current helps prolong the life of our EP insulators. The overall result is reduced maintenance requirements and costs.



Two views of a McGill Model 4-400 EP with 8 Model 200 modules, 4 top structures, 8 rapping subassemblies, 8 side access doors, and 8 hoppers.



Module Sizes (height x width)



Drawing of a basic McGill EP module with top structure and hopper.

Side Access Doors

One of the many special features of the McGill AirClean EP design is the side access doors. As shown in this illustration, large, quick-opening doors are provided between each field and at each 10-foot level. McGill AirClean believes features such as this are essential for safety and convenience.

Internal Walkways

Walkways built into each module provide unequaled access and convenience for maintenance and inspection.

Small Sizes

The collection surfaces in a McGill AirClean EP consist of parallel rows of high-voltage and grounded collection plates arranged in alternating order. Each type of plate is charged with opposite polarity, and they are spaced closer together than the single-polarity plates in conventional EPs. Because of the compact design, our EPs are physically smaller than conventional units, making them a better choice for installations where space is limited.

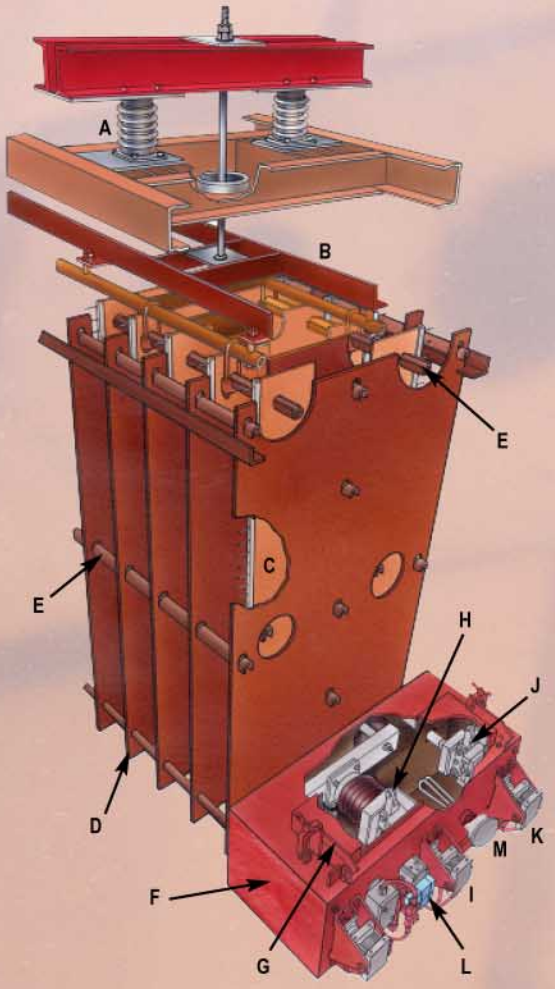
Modular Construction

McGill EPs are constructed of individual modules. Using these modular building blocks, we can provide a broad range of EP sizes. This modular concept enables us to match your needs accurately, so that the EP we provide is the right size and price for your application. A modular design is practical for our EPs because of the high-voltage needle/plate collection electrodes and compact size. It is impractical for conventional EPs with their large, fragile electrodes.

All of our EP modules are about 10 feet high by 8 feet in depth. Nothing else changes but the width. Components such as rapping devices and insulators remain the same. Each module is self-supporting, requiring no external structural frame. The internal structure serves as both the main shipping frame and the permanent frame for supporting the high-voltage and grounded collection electrode plates. This internal structure also provides a smooth exterior surface to insulate, minimizing cold spots and differential thermal expansion.

Module Sizes

The five module sizes pictured in the figure above are used to build McGill AirClean's field-assembled EPs. Small pre-assembled EPs are also available, using Model 25, 50, and 75 modules (7.5 feet high).



A simplified drawing of a McGill EP design, shown from the top down, depicting:

A. Support insulators for high-voltage plates
B. Adjustable hanging frame for high-voltage plates
C. High-voltage needle/plate collection electrodes
D. Grounded collection plates
E. Plate spacers
F. Rapping/insulator enclosure, internally insulated
G. Key-interlocked access door
H. Insulator and mechanism for rapping high-voltage plates
I. Pneumatic cylinder for rapping high-voltage plates
J. Mechanism for rapping grounded plates
K. Pneumatic cylinders for rapping grounded plates
L. Solenoid valves for pneumatic control
M. Insulator enclosure heater

Typical installation of a McGill AirClean modular electrostatic precipitator.

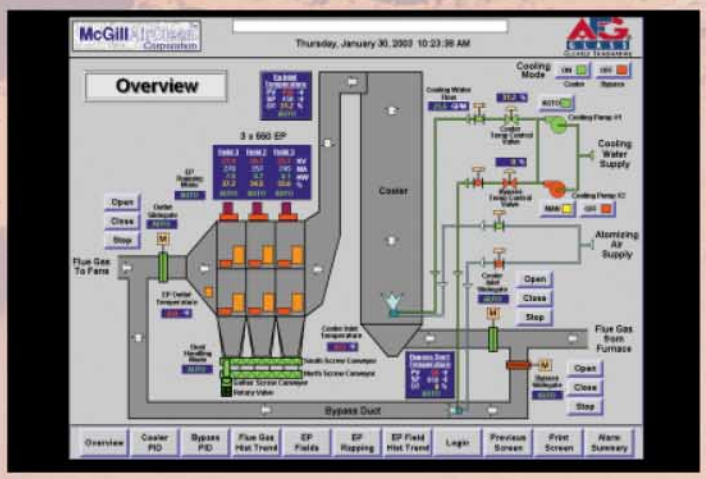
1. **Setting one of three hoppers for a Model 3-200 EP.**
2. **Rigging a Model 100 EP module, a 12,400-pound lift.**
3. **Lifting the second Model 100 module, the bottom part of the second field.**
4. **Lifting the third of six modules. Only a very small crew is required to erect any size precipitator.**
5. **Setting the top structure in place for the first field, a 4,700-pound lift.**
6. **The inlet transition is in place ahead of the first EP field. Transitions can also be designed for top, bottom, and side entry.**

Standard Designs

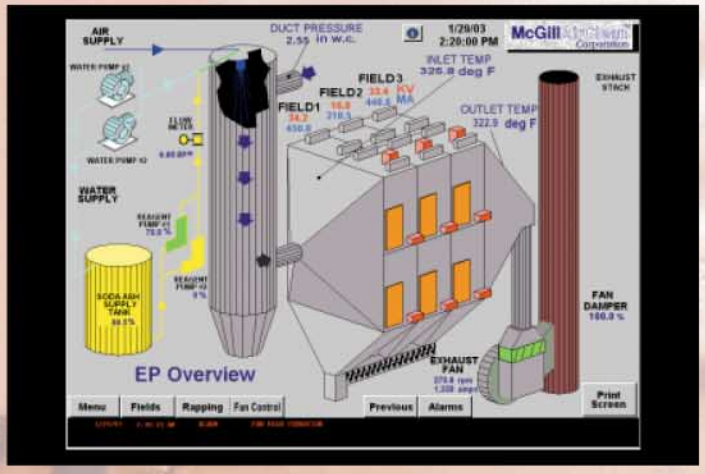
Modular construction means standard designs with consistent high quality. We have a standard design for virtually all EP components: EP modules with rapping and access doors, top structures with insulators, hoppers, horizontal support structures, access platforms, and stairs. The only items that are not always standard are the vertical support structure and the inlet and outlet transitions for connecting the EP to the rest of the air pollution control system, which often must vary from site to site.

Low Construction Costs

Modular design minimizes expensive field construction because as much of the work as possible is done in our manufacturing plant. We manufacture complete modules and ship them to the jobsite for installation. Conventional EPs are assembled piece by piece in the field, often making installation costs as high as the cost of the equipment itself. McGill AirClean's modular EP design reduces installation costs and makes it practical to add to or remove an EP if future changes require it.



PC-SAM's control screen provides user-friendly access to the precipitator system's control functions.



Adjustments to the precipitator's subsystems can be easily and quickly made with a few keystrokes.

The PC-SAM control system has extensive reporting and trending capabilities, including on-screen operation and maintenance manuals.

Control Systems

To make our EP systems easy to operate and maintain, we supply powerful PC-SAM™ computerized control systems. Each control system combines a programmable logic controller (PLC) with a personal computer (PC). We give you simplified control, on-line service, and greater data acquisition, with historical trending capabilities.

Simplified Control

The PLC is the brain of the control system, making decisions about the day-to-day operations of your air pollution control equipment. The PC puts control of all functions at your fingertips, while providing visual displays so you can monitor operations. Our PC-SAM control program is user friendly and can be set up for on-site or remote control. The PC can be programmed to work with controls for the precipitator and subsystems of your process, giving you a single integrated system.

On-Line Service Capability

With McGill AirClean's on-line service capabilities, our engineers can monitor and troubleshoot your air pollution control system quickly and economically. When you experience a problem, we can view your system's operation on-line from the computers at our office. In many cases, we are able to diagnose and correct emission control system problems without the time and expense of an on-site service call.

Data Acquisition

The PC records operations data such as temperature, pressure, gas flow, emissions levels, voltage, current, opacity versus power, and voltage versus rapping cycle. Data can be stored for six months or longer and can be used to show trends in the EP system's operation, helping you monitor performance and diagnose potential problems.

McGill AirClean installed three spray-dry scrubbers, two electrostatic precipitators, and a fabric filter to control acid gas and particulate emissions from this mass-fired municipal solid waste incinerator located in North Carolina.

Using this McGill Model 3-500 wet EP, a Kansas fiberglass manufacturer was able to meet the EPA's most recent air pollution control standards for fiberglass forming and curing.

A McGill Model 5-600 x 4 EP system collects approximately 40 tons of iron oxide per day from two basic oxygen furnace vessels in Colorado.

Applications

For approximately 40 years McGill AirClean has been solving difficult air pollution control problems for a wide range of applications. In addition to our standard EP systems, we provide wet EPs to control process emissions that contain organic compounds, fine particulate, sticky materials, or combustible materials.

For emissions that contain acid gases, we provide spray-dry scrubbers and dry reagent injection systems. Both are complete pretreatment systems for converting gaseous pollutants to solid materials that can be collected by an EP or fabric filter. We have provided a great many systems to effectively control acid gases, such as hydrogen chloride, sulfur dioxide, hydrogen fluoride, and boric acid.

A McGill AirClean Model 3-500 dry EP and spray-dry scrubber control acid gases and particulate from three kilns at a brick manufacturing plant in Ohio.

Fly ash from two coal-fired boilers providing steam for an Ohio university's power plant is controlled by a McGill Model 2-300 EP.

McGill AirClean has numerous installations of dry and wet EPs on wood-fired boilers. The photo on the left is of a Model 3-900 x 2 dry EP collecting fly ash from a paper mill in South Carolina while the photo on the right depicts a Model 3-350 wet EP controlling emissions from a paper mill in Georgia.

A McGill AirClean spray-dry scrubber and Model 3-500 dry EP collect SO_x and particulate from the gas stream of a float glass furnace in Wisconsin.

For small-scale applications, we offer skid-mounted dry reagent feed systems that are factory assembled for quick installation.

McGill AirClean combined a spray-dry scrubber, dry EP, and two wet EPs to provide air pollution control for this California fiberglass plant.

McGill AirClean's ThermaGrid™ regenerative thermal oxidizers (RTOs) control volatile organic compounds (VOCs) for a variety of applications and industries at substantial energy savings over other types of thermal oxidizers.

Pictured (right to left) is a McGill 2 x 525 wet EP followed by a ThermaGrid 6-149 RTO as they control particulate and VOCs from a flash-tube dryer at an MDF plant in Pennsylvania. This is the first time in the industry that both pieces of equipment were provided by a single supplier.

The design, fabrication, and erection of a three-flue exhaust stack, 12 feet in diameter by 210 feet high, was part of this McGill 4-350 x 3 EP system for an Alexandria, Virginia, municipal solid waste facility.

Complete Turnkey Service

McGill AirClean can supply complete air pollution control systems, working with you at every stage of a project to solve your problem. If required, we can start by using our mobile testing equipment to analyze your emissions and size a full-scale system for your application. If both particulate and acid gas emissions need to be controlled, we can supply a system that combines an EP with a spray-dry scrubber or dry reagent injection. We can handle construction of your EP system, supplying all the necessary equipment. Once installation has been completed, we will work with you to make sure you continue to meet emissions regulations for years to come.

Auxiliary Equipment

We usually handle the entire air pollution control project, supplying engineering, manufacturing, and construction, including the following equipment:

Particulate Control

- Electrostatic Precipitators (wet or dry)
- Fabric Filters

Acid Gas Control

- Reagent Storage (wet or dry)
- Reagent Preparation
- Reagent Transport (wet or dry)
- Spray-Dry Scrubbers
- Reaction Chambers

Control of Volatile Organic Compounds (VOCs)

- Regenerative Thermal Oxidizers

Evaporative Coolers

- Up Flow
- Down Flow
- In Duct

Auxiliary Equipment

- Recycling Systems
- Disposal Systems
- Stacks
- Control Systems
- Continuous Emission Monitoring (CEM)

We can inspect your EP on a scheduled basis to identify and solve potential problems. Note the internal access space.

McGill AirClean can rebuild or upgrade older equipment. Technicians here work on a project that included rebuilding the EP's internals and installing a new rapping system.

A McGill AirClean mobile EP and spray-dry scrubber can be used to test emissions and analyze your control needs.

Emissions Testing

McGill AirClean can provide testing services to analyze your emissions problem and develop an effective solution. Our mobile testing equipment includes an EP that can operate wet or dry, a spray-dry scrubber, a quench tower, and a water filtration and recirculation system. With a few weeks of testing, we can collect enough data to size a full-scale EP system and verify that it will meet your emissions control requirements. Tests are conducted at a realistic volume flow of approximately 5,000 to 10,000 actual cubic feet per minute.

We can provide Environmental Protection Agency stack testing for emissions quantities at the inlet and outlet. Results can be evaluated quickly during the program in case operating condition changes are required. Other tests conducted can include particle size measurements, gas analysis, and opacity monitoring. Chemical and resistivity analyzes of the collected dust can be done to predict how a full-scale precipitator will perform at temperatures and moisture levels different from those encountered during the mobile EP testing.

Computer-optimized, experimental design techniques are often used to establish the most useful series of tests. A detailed technical report is provided soon after the testing program has been completed.

Repair and Maintenance

McGill AirClean has a complete service program to maintain, repair, upgrade, and rebuild EP systems. We provide emergency repair service in case a problem with your EP forces you to shut down. Our engineers diagnose problems and solve them to get you back on line quickly. Many high-demand replacement parts are stocked and can be shipped immediately.

To prevent problems from becoming emergencies, we can provide periodic inspections and preventive maintenance that meets your schedule. We rebuild and upgrade EP systems if performance is affected by process changes or wear and tear. We also upgrade systems with the latest technology to improve performance and reduce operating costs.

McGill AirClean Corporation

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