

Pointers on Selecting Equipment for Industrial Gas Cleaning, by C. E. Miller (*Chemical and Metallurgical Engineering*, 45, March, 1938, p. 132-5).

Electrical Precipitation, by W. A. Schmidt and E. Anderson (*Electrical Engineering*, 57, August, 1938, p. 332-338).

Electrostatic Precipitation for Cleaning Industrial Gases, by H. W. Wagner (*Fuel Economist*, 10, 1935, p. 895-9, 942-5, 971-3).

Dust Precipitation, by M. Pauthenier and Mme. Moreau-Hanot (*Electrician*, 113, August 10, 1934, p. 187-9).

Alternating Current Precipitators for Sanitary Air Analysis: II. Acid Formation in Electric Precipitators, by W. G. Hazard and Tomoyoshi Ishikawa (*Journal of Industrial Hygiene*, October, 1932, p. 367-70).

Electrical Precipitation, by A. W. Simon and L. C. Kron (*Electrical Engineering*, 51, February, 1932, p. 93-5).

The Mathematical Theory of the Cottrell Electric Precipitator, by A. W. Simon (*Iron and Steel Engineering*, 6, 1929, p. 143-6).

Progress in the Art of Electrical Precipitation Since 1900, by P. E. Landolt (*Transactions American Electrochem. Society*, 51, 1927).

Some Factors and Principles Involved in the Separation and Collection of Dust, Mist and Fume from Gases, by Evald Anderson (*Transactions American Institute of Chemical Engineers*, 16, 1924, Pt. 1, p. 69-86).

Electrical Precipitation of Solids from Smelter Gases, by Ross B. Rathbun (*Transactions American Institute of Electrical Engineers*, 41, 1922, p. 815).

Electrical Engineering Features of the Electrical Precipitation Process, by G. H. Horne (*Transactions American Institute of Electrical Engineers*, 41, 1922, p. 808).

Automatic Control

Basic Types of Control, Types and Functions of Controllers, Designation of Temperature Control, Automatic Control Terminology, Residential Control Systems, Control of Automatic Fuel Burning Appliances, Zone Control, Control of Unit Systems, Control of Refrigeration Equipment, Application of Control Devices to a Typical System

THE function of *automatic control*, as applied to the heating, ventilating and air conditioning industry, may be broadly subdivided into the maintenance of *temperature, humidity, pressure, and liquid levels* within predetermined ranges. It automatically coordinates the operation of the various controlled mechanisms in proper sequence to produce the desired result. A thermostat, for instance, is a controller responsive to temperature which initiates a force that repositions valves, dampers, etc., as required to maintain selected temperatures. Similarly, a hygrostat or humidistat is a controller responsive to relative humidity which initiates a force that repositions the controlled sources as required to maintain a selected relative humidity.

BASIC TYPES OF CONTROL

There are two basic types of controllers, (1) the *two-position, on-off, or positive acting controller*, which functions to move a valve, damper or electric switch through its full travel (not necessarily 100 per cent) from open to closed position and vice versa, and (2) the *throttling, proportioning, or intermediate acting controller* which functions to reposition the valve, damper, or other controlled device by small increments of its total travel as the controller senses a slight change in the controlled condition. The available equipment may be broadly sub-divided into three main groups, (a) *self-contained equipment*, (b) *electrically operated equipment*, and (c) *pneumatically operated equipment*.

Self-Contained Equipment

In *self-contained controllers* the primary source of power is the vapor pressure of an enclosed volatile liquid which varies with the temperature changes of the controller bulb. Such pressure changes are transmitted directly into the bellows or diaphragm mechanism of the controlled valve. Devices of this type produce gradual operation and are used to regulate the flow of heating and cooling media to coils, radiators, and liquid tanks. Each instrument is designed to operate within a predetermined selected temperature range and for a given condition. Care must be exercised to select a type which has the ability to withstand any possible over-run of temperature at the control bulb without damage to the instrument. Instruments of this type are available either with a rigid bulb or with a flexible tubing which connects the control bulb to the head of the instrument. This tubing is usually protected by a flexible metal covering or armor and is available in varying lengths.

Electrically Operated Equipment

Electrically operated equipment for either two position control or throttling control is available in either low voltage or high voltage type. Low voltage equipment usually is designed to operate on 20 to 24 volt current. High voltage equipment may be used in connection with any of the