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CHAPTER 46

INDUSTRIAL EXHAUST SYSTEMS

Elements of Exhaust Systems, Hoods or Enclosures, Capture Velocities, Air Volume, Duct System Design, Calculations, Construction of System, Materials, Details, Air Flow Producing Equipment, Air Cleaning Equipment, Make-Up Air, Maintenance of Performance, Materials for Corrosion Resistance

IN industrial plants, some type of exhaust system designed to collect and remove dusts, fumes, mists, vapors, and gases is installed to protect health and safety of industrial personnel, promote worker efficiency, salvage usable material, or improve plant housekeeping. This chapter will not include consideration of systems similar in design, but used to convey heavy loadings (100 or more grains per cu ft) of materials. Definitions of various air contaminants, their particle sizes, maximum allowable concentrations, and upper and lower explosion limits are included in Chapter 8, Air Contaminants.

Exhaust systems are extensively used for control of contaminants from:

1. Mechanical cutting and abrading operations including abrasive blasting and rock cutting.
2. Fuel burning and exhaust gas producing operations.
3. Molten materials handling operations.
4. Welding, burning, and soldering operations.
5. Fiber handling operations.
6. Volatile and gaseous material handling operations.
7. Chemical processes.

Local exhaust systems should be considered whenever possible rather than general ventilation methods which allow contaminants to be dispersed within the workroom. More positive control, great reduction in exhaust volume handled, and reduced cost of air cleaning equipment will result.

ELEMENTS OF EXHAUST SYSTEMS

An exhaust system will consist of (1) hoods or enclosures at all sources of air contamination, (2) branch and main ducts through which an air stream transports the contaminant to air cleaning device or to the outside atmosphere, (3) air moving equipment to produce required air flow into hoods or enclosures, and (4) air cleaning equipment when required. See Chapter 34, Part II, for discussion of types, applications, and principles of operation.

HOODS OR ENCLOSURES[1 to 10]

Basically, hood design requires sufficient knowledge of a process or operation so the most effective hood or enclosure can be installed to provide minimum exhaust volumes for effective contaminant control. The more complete the enclosure, the more economical and effective will be the installation. Many designers develop their hoods by mentally enclosing the operation completely and then providing access and working openings as indicated. From this complete enclosure concept are developed the familiar hood shapes like booths, side or downdraft hoods (with or without side shields). All