

## **INDUSTRIAL VENTILATION**

A ventilation system can be defined as any process that supplies or removes air, by natural or mechanical means, into or from an area. Since the air in an industrial setting may become contaminated or heated, industrial ventilation systems are designed to keep air breathable and thermally comfortable as it is being supplied or removed. Although air moving systems come in many shapes, sizes and forms, industrial ventilation systems are commonly composed of hoods, ducts for transporting contaminated air, filters, fans, and a point of exhaust.

By capturing and controlling contaminants near their source or by diluting them with large quantities of fresh air, air-moving systems reduce airborne contaminant concentrations without requiring individuals to wear respirators.

### **Types of Ventilation Systems**

There are two broad classifications of air moving systems: local exhaust ventilation and general (or dilution) ventilation.

Local exhaust ventilation systems capture and remove contaminants at the point of generation, before they can escape into the workroom air. This type of ventilation system is one of the most widely used engineering control technique. By design, local exhaust systems are well suited for processes which generate large amounts of dust, use harmful or flammable chemicals, or would otherwise present housekeeping or employee comfort control problems.

General ventilation systems are designed to supply areas with large amounts of fresh air to keep the concentration of contaminants within an area below the recommended exposure limits. For example, carbon monoxide gas may be produced when propane gas powered vehicles are used indoors. In high concentrations, carbon monoxide may cause headaches and nausea. Obviously, mobile vehicles cannot be locally exhausted. Therefore, facilities using propane vehicles must provide sufficient fresh air exchanges to control carbon monoxide concentrations. Since contaminants are not removed from the atmosphere before entering an individual's breathing zone, general ventilation is not recommended for the control of extremely toxic chemicals. General ventilation systems, therefore are used in areas where small amounts of chemicals are used.

### **What Is the Importance of Makeup Air?**

Simply, any air that is removed from a room or building must be replaced. Often, a return air system will draw, heat or cool (if needed), and distribute outside air through a system of ducts, fans and diffusers. Either the efficiency of exhaust systems will be reduced or air will rush through doors, windows and other openings if the return air and exhaust systems are not equalized or balanced. Both conditions can affect the control of contaminants and the comfort of persons within the building.

What Is the Effect of Local Cooling Fans?


Local cooling fans provide relief in hot working environments by increasing the amount of perspiration that can be removed from an individual's skin. For that purpose, cooling fans are both desirable and commonly used. Simple air circulation, by itself, does not

remove impurities from the air or supply clean air for breathing. Technically, local cooling fans are not considered a part of industrial ventilation systems.

The use of local cooling fans, however, may significantly effect the efficiency of a local exhaust system and, therefore, the air quality for the individual using the fan and at adjacent job positions. The effective range of a fan is 30x greater than the capture capacity of an exhaust duct (that is it is much easier to push air than pull air). A cooling or pedestal fan should not be placed where it interferes with a local exhaust system. Nor should such a fan be used as a means to reduce personal exposure to hazardous chemicals since the fan will blow the chemicals into adjacent work areas, exposing additional employees and creating housekeeping problems.

### **How Can Ventilation Systems Be Used Most Effectively?**

Adjustments to the ventilation system may alter the system's balance and reduce its effectiveness. Therefore, adjustments to the air moving systems must only be made by authorized persons. Contact your supervisor immediately if there is a noticeable decline in air quality at your position.

Know and understand how the exhaust system at your job position was designed and intended to be used. Have your supervisor explain the use of flow restrictors, diverters and baffles which can alter the air movement. By opening or closing the proper baffles you may notice large increases in the control of contaminants at your position. (Use tion, however since your gain may be at someone else's expense).

Keep all hoods, slots and duct work openings clear of debris, obstructions and buildup which reduce how much air enters the system. Position yourself and your equipment in a way that permits the greatest amount of air movement into the exhaust hood.

Finally, continuously observe the system for damage and flow restrictions. A pressure gauge commonly installed on industrial ventilation systems, known as a manometer, is often a good means to judge if the system requires maintenance. Report any condition that changes the effectiveness of the system to your supervisor.

At regular intervals, conduct the system maintenance that you are authorized to perform, such as changing filters in spray booths. Changing the filter regularly will reduce the amount of resistance in the system, improving its mechanical economic efficiency.