Lateral Exhaust Systems

Lateral exhaust as developed for chromium plating[16] is preferred to canopy type hoods. The method makes use of drawing air and fumes laterally across the top of vats or tanks into slotted ducts located at the top and extending fully along one or more sides of the tanks. The slot width is usually based on a slot velocity of 2000 fpm, but should not be less than 1 in. wide. The hood should not be required to draw the air laterally for a distance of more than 24 in. and the level of the solution should be kept 6 to 8 in. below the top of the tank. If width of tank is over 24 in. a double lateral exhaust should be used with slots on both sides.

It has also been determined that a similar control may be used for tanks wider than 3 ft when the same velocity (2000 fpm) is maintained through a slot which is increased $\frac{1}{4}$ in. for every foot of width greater than 3 ft. When these slots must be extended more than 6 ft in length, some method of spreading the flow is necessary to provide even air flow distribution through the entire slot length. This can be accomplished by tapering the slot, which incidentally will add to the resistance of the system. A more economical approach is to place properly spaced vanes in the side ducts, or to branch the side ducts[17].

Spray Booths

In the design of an efficient spray booth, it is essential to maintain an even distribution of air flow through the opening and about the object being sprayed. While in many instances spraying operations can be performed mechanically in wholly enclosed booths, the volatile solvent vapors produced by spraying operations may reach injurious or explosive concentrations. At all times the concentrations of these vapors, and particularly those containing benzol, should be kept well below 100 parts per million in the breathing zone of the worker. Vapors from many spraying operations are dangerous to the health of the worker and care should be taken to minimize exposure to them.

It is recommended in the design of spray booths that the exhaust duct be located at the end of the booth opposite the opening. In front of this duct should be placed baffle plates which will cause a uniform air velocity distribution across the frontal area. The air volume should be sufficient to maintain a velocity of not less than 150 fpm over the open area of the booth.

Spray booths may be either the dry or wet type. The latter is the more modern design, provided with a water-wash section for the removal of the solid over-spray contaminants and for the absorption of water-soluble thinners or solvents.

The most modern innovation is the electrostatic spraying and detearing unit. Objects to be sprayed are passed through a high tension electrostatic field, which not only produces a more evenly sprayed surface, but materially reduces excessive over-spray. The detearing unit removes tear-drops of sprayed material from the edges or ends of air-drying sprayed objects as these objects pass through a high tension electrostatic field.

Hoods for Chemical Laboratories

Hoods used in chemical laboratories are generally provided with sliding windows which permit positive control of the fumes and vapors evolved by the apparatus. Their design should offer easy access for the installation of chemical equipment and should be well lighted. Air velocities should not exceed 100 fpm when the window is fully open.

Kitchen Hoods

The length and width of kitchen hoods should be such as to extend beyond the extreme projection of the ranges, broilers, etc., over which they are installed. The minimum projection or overlap should be 12 in. Where space conditions permit, range hoods should be about 2 ft high so as to provide a reservoir to confine momentary bursts of smoke and steam until the exhaust system can evacuate the hood. Range hoods should be located as low as possible to increase their effectiveness.

In general the amount of air to be exhausted from restaurant range hoods is at the rate of 100 cfm per square foot of face area. In some cases, where the application is principally frying and where it is not practicable to install a hood 2 ft high, it is recommended that the face velocity be increased from 100 to 150 fpm, depending on peak load conditions in the kitchen. Exhaust connections to range hoods should always be made at the top and back of hoods, and should be spaced preferably not more than 6 ft apart and be rectangular in shape with the long side parallel to the back of the hood. Exhaust openings into range hoods should be designed to maintain a velocity of 1500 to 1800 fpm.

An approved fire damper with fusible link should be (and is required by code in many states) installed in the main exhaust duct or branch adjacent to the range hood. Should there be more than one hood connected to a common duct, then the branch duct to each hood should be provided with a fire damper. Access doors should be provided at the fire damper for purpose of inspection, cleaning, or for renewal of fusible link. All exhaust piping to range hoods, commonly called grease ducts, should be provided with tight fitting cleanout doors of adequate size to permit easy removal of grease. Some engineers use filters to advantage in hoods which are subject to grease conditions.

Hoods over steam tables should be of construction similar to range hoods. It is good practice to design such hoods with a face velocity of 60 to 70 fpm. Hoods over dishwashing machines are usually relatively small and generally 1500 to 2000 cfm per hood is allowed, which is equivalent to a velocity of approximately 100 fpm per square foot of face area. Range hoods in diet kitchens are constructed the same as restaurant range hoods but with less exhaust air per square foot of face area, depending upon the nature of the food cooked.

Hoods are not often used in private residences unless they are quite large and the consideration of expense is not important. For such residences the hoods should be designed on the same basis as diet kitchens. Most all residence kitchens can be effectively and economically ventilated by the installation of a built-in kitchen ventilator, which should be located in an outside wall and in close proximity to the kitchen range. It has been found that the capacity of the built-in kitchen ventilator should be at least 350 cfm regardless of the size of kitchen. This can be justified on the

Table 4. Approximate Conveying Velocities

Material Conveyed	Design Velocity FPM
Vapors, gases, fumes, very fine dust	2,000
Fine dry dusts	3,000
Average industrial dusts	3,500
Coarse particles	3,500–4,500
Large particles, heavy loads, moist materials	4,500 and over