

14. Methods of supporting and bracing rectangular ducts should be used so that sagging and buckling of sheets is entirely prevented. Hangers and angle iron-stiffeners are recommended for ducts over 36 in. wide at intervals of 4 ft. 0 in.

15. For public building work ducts should be thoroughly braced to prevent vibration of sides.

16. Longitudinal seams and transverse joints should be flat and smooth inside. Slip joints should be in the direction of air flow.

INSULATION FOR DUCTS.

The overall heat resistance of metallic air ducts is very small and diminishes as the velocity of the air increases. Therefore, ducts used for carrying heated or cooled air should be insulated, if the maximum of efficiency in the delivery of air at the proper temperature at the outlets is desired.

Insulation is particularly important if it is desirable that the temperature of the spaces through which the ducts pass be not affected by the temperature of the air in the ducts.

For moderate temperatures, the flexible and rigid (board) forms of insulation, as well as corkboard, may be used satisfactorily. Generally not less than 1 in. of insulation should be used, and if the flexible type is installed, care should be exercised to avoid decreasing its thickness by compression, as the heat resistance will thereby be greatly reduced.

The joints of the insulation should be lapped, broken or sealed. If the flexible insulation is used, the joints should be lapped. If the rigid type of insulation is used, it should preferably be applied in two or more layers with the joints of each layer offset with respect to the preceding one. If corkboard is used and is applied in a single layer, the joints should be sealed.

The insulation may be attached with metal workers' screws or steel clips, or fastened in place with a spiral winding of copper wire with frequent stitches to prevent loosening in case of a broken wire. Canvas is frequently used to cover the insulation although this material is sometimes objectionable because of the fire hazard. Copper fly screen is sometimes used to fasten the insulation and to provide a protecting surface.

If the rigid type of insulation is used, the surface may be protected by the application of fireproofing paint directly to the insulation, thus obviating the necessity of any covering. Where the fire hazard is of less importance, any good lead and oil paint may be used and applied directly to the insulation after it has been sized, excepting in the case of flexible insulation. If the insulation is likely to be subjected to damage by traffic or other abuse, it should be properly protected. Heavy roofing is sometimes used for this purpose, and is also used for covering ducts placed out-of-doors.

If the duct carries hot gases or hot air, the insulation should be of the character used for steam and hot water pipes. This type of insulation usually comes in block form and may be wired to small rods placed about 6 in. apart around the periphery of the duct, parallel to its axis, the rods being held by structural tees or angles placed transverse to the duct, and which have holes in the flanges for engaging the rods.

CHAPTER 28

PNEUMATIC EXHAUST SYSTEMS

Types of Systems; Air Velocity; Size of Connections; Typical Layout; Design of Hoods; Conveyor Pipes; Fan Selection; Collectors.

PNEUMATIC exhaust systems may be classified by the economic purpose to be accomplished by the industries served, or by the type of system used.

Classifying exhaust systems by industries served, they fall in subdivisions such as metal working, woodworking, leather and shoe manufacturing, rubber industry, flint grinding, pottery works, pulverizing works, celluloid manufacturing, printing establishments, felt hatting and fur manufacturing, textile mills, grain and cereal industry, etc.

TYPES OF SYSTEMS

The type of exhaust system to be used is determined by the industry served, kind of material handled, and the work to be accomplished. There are two general arrangements, the central and the group systems. In the central system a single or double fan is located near the center of the shop with a piping system radiating to the various machines to be served. In the group system, which is sometimes employed where the machines to be served are widely scattered, small individual exhaust fans are located at the center of the machine groups.

The group arrangement has the advantage of flexibility.

Exhaust systems are also classified by the means employed to collect dust or other material handled. The dust or refuse may be collected and controlled by enclosing hoods, open hoods, inward air leakage or by exhausting the general air of the room.

With some classes of machinery it is not feasible to closely hood the machines and in these cases open hoods over or adjacent to the machines are provided to collect as much as possible of the dust and fumes. In this class come such machines as rubber mills, package filling machinery, sand blast, crushers, forges, pickling tanks, melting furnaces, and the unloading points of various types of conveyors.

The open hoods should be placed as close to the source of dust or fumes as possible, with due regard to the movements of the operator.

When the hood has to be placed at some distance above the machine it should be large enough to encompass an area of considerable extent as diffusion is usually quite rapid.

Consideration must also be given to the natural movement of the fumes. For those that are lighter than air the hood should be over or above the machine and where a heavy vapor or dust-laden air at ordinary