exhausted from a hood cannot change without a change in hood suction reading.

The Pitot tube can be used for routine check purposes instead of the static pressure method.

Difficulty from plugging may be encountered where heavy dust loads or moist air is encountered. In any case, the hood suction method of checking can more readily be delegated to an assistant having no technical training, whereas the Pitot tube method requires care in reading velocity pressures in an exact position with the tube paralleling the flow of air. U-gages have been standard plant equipment long enough to eliminate any feeling of uncertainty in their use.

Since pressure readings vary as the square of the velocity or volume of flow, a slight change in flow is magnified by a comparison of gage readings. Normally, a reduction of volume or velocity of 10 to 15 percent will not be sufficient to reduce the effectiveness of the exhaust system. This range is equivalent to a reduction in static pressure readings of 19 to 30 percent.

A marked reduction in hood suction can often be traced to one or more of the following items:

1. Reduced performance by the exhaust fan caused by reduced speed due to belt slippage, wear on rotor or casing, or an accumulation of material in the rotor or casing, obstructing the air flow.
2. Incorrect direction of exhauster rotation.
3. Reduced performance caused by defects in the exhaust piping, such as accumulations of material in branch or main ducts due to insufficient conveying velocities, condensation of oil or water vapors on duct walls, adhesive characteristics of material exhausted.
4. Leakage losses caused by loose clean-out doors, broken joints, holes worn in duct (most frequently in elbows), or poor connection to the exhauster inlet.
5. Losses in suction due to additional exhaust points added to the system or a change of setting of blast gates in branch lines.
6. Increased pressure loss through the dust collector due to lack of maintenance, improper operation, wear, etc.

MATERIALS REQUIRED FOR CORROSION RESISTANCE

In many cases, exhaust systems including hoods, ducts, air flow producing equipment, and air cleaning equipment will require protective coatings if carbon steel is used, or other materials of construction will be required. Need for such materials will be determined by (a) the corrosion rates on interior or exterior duct surfaces, (b) protection against product contamination, and (c) explosion hazards.

Of the above groups, construction for corrosion protection is the most difficult due to the complex factors that influence rate of corrosion. It is seldom possible to predict the concentration, composition, and dry- and dew-point temperatures that will exist in actual operations. A guide for selecting corrosive resistant materials based on a survey of actual experiences has been reproduced in Tables 7 and 8.[40]

REFERENCES

The material in this chapter is based largely on the recommendations of the *American Conference of Governmental Industrial Hygienists* as published in the *Industrial Ventilation Manual*, 1952 Edition.

[1] The Determination and Control of Industrial Dust, by J. J. Bloomfield and J. M. DallaValle (*Bulletin 217, U. S. Public Health Service*, 1935).

[2] *Exhaust Hoods*, by J. M. DallaValle (Industrial Press, New York, 1952).

[3] Design of Exhaust Hoods for Dust Control Systems, by T. Hatch (*Journal of Industrial Hygiene and Toxicology*, Vol. 18, 1936. p. 595).

[4] Air Dilution in Industrial Ventilation, by W. C. L. Hemeon (*Heating and Ventilating*, February 1941).

[5] Practical Application of Industrial Exhaust Ventilation for the Control of Occupation Exposures, by B. F. Postman (*American Journal of Public Health*, Vol. 30, 1940, p. 149).

[6] *Principles of Industrial Process Ventilation*, by W. N. Witheridge (*University of Michigan* Inservice Training Course, October 1945).

[7] *Industrial Dusts*, by Philip Drinker and Theodore Hatch (McGraw-Hill Book Co., New York, 1936)

[8] *Design of Industrial Exhaust Systems*, by J. L. Alden (Industrial Press, New York, 1948).

[9] Ventilation, by W. N. Witheridge (*Industrial Hygiene and Toxicology*, Vol. I, Chap. 10, Edited by F. A. Patty. Interscience Publishers, New York, 1948).

[10] Transport Velocities for Industrial Dusts, by A. C. Stern et al (*American Industrial Hygiene Association Quarterly*, December 1948).

[11] *Industrial Health Engineering*, by A. D. Brandt (John Wiley and Sons, New York, 1947).

[12] Velocity Characteristics of Narrow Exhaust Slots, by Leslie Silverman (*Journal of Industrial Hygiene and Toxicology*, November 1942, p. 267).

[13] *Industrial Ventilation Manual*, (*American Conference of Governmental Industrial Hygienists*, 1952 Edition).

[14] *Code of Recommended Good Practice for Metal Cleaning Sanitation* (*American Foundrymen's Association*).

[15] A Study of Asbestosis in the Asbestos Texile Industry, by W. C. Dressen et al (*U. S. Public Health Service, Bulletin* 241, 1938).

[16] A Study of Dust Control Methods in an Asbestos Fabricating Plant, by R. T. Page and J. J. Bloomfield (U. S. Public Health Reports, Reprint No. 1883, Nov. 26, 1937).

[17] Rules Relating to the Control of Silica Dust in Stone Crushing Operations (*New York State Department of Labor*, Industrial Code Rule No. 34, July, 1942).

[18] Design of Exhaust Systems, by J. M. Kane (*Heating and Ventilating*, November 1945, p. 68).

[19] Foundry Ventilation, by J. M. Kane (*The Foundry*, February and March, 1946).

[20] Pottery Dusts: Their Collection and Removal, by W. M. Oddie (*Pottery Gazette*, Vol. 53, 1928, p. 1280).

[21] Scrapbook of Exhaust Hoods, by J. M. Kane (*Heating and Ventilating*. Portable Grinding—July 1950; Grinding, Polishing, Buffing—August 1950; Foundry Shakeout—November 1950; Melting Furnaces—February 1951; Pottery—March 1951; Mixers—April 1951; and Woodworking—June 1951).

[22] Design of Exhaust Ventilation for Solid Material Handling, by R. T. Pring et al (*Industrial and Engineering Chemistry*, November 1949).

[23] *Hartzell Blowers: Engineering Data & Installation* (Hartzell Propeller Fan Company, Bulletin 1001).

[24] The Application of Local Exhaust Ventilation to Electric Melting Furances, by J. M. Kane (Transactions, *American Foundrymen's Association*, Vol. 52, 1945, p. 1351).

[25] Control of Silicosis Hazard in the Hard Rock Industries. II. An Investigation of the Kelley Dust Trap for Use with Pneumatic Rock Drills of the Jackhammer Type, by T. Hatch et al (*Journal of Industrial Hygiene*, February 1932, p. 69).

[26] Modified Design of Hay Dust Trap, by P. S. Hay (*Journal of Industrial Hygiene*, January 1930, p. 28).

[27] American Standard for Grinding, Polishing and Buffing Equipment Sanitatior (*American Standards Association*, Z 43-1941).

[28] Swing Frame Grinder Dust Control, by J. M. Kane (*The Foundry*, August 1944).

[29] *What We Make* (B. F. Sturtevant Co., Catalog No. 500).

[30] Ventilation of Motion Picture Booths, by P. Drinker and J. R. Snell (*Journal of Industrial Hygiene and Toxicology*, April 1938, p. 321).

[31] How to Justify an Industrial Air Conditioning Investment, by P. J. Marschall (*Heating, Piping and Air Conditioning*, February 1952, p. 71).

[32] How to Design Exhaust Hoods for Quarts-Fusing Operations, by E. C. Riley et al (*Heating and Ventilating*, April 1940, p. 23).