

9. The use of varied metals and special finishes for different conditions encountered is of prime importance. The present day metal market affords wide range of choice, and a study of requirements for the individual application should be made.

10. Wherever moisture is present, either in the form of free water or a possibility of condensation occurring, galvanized iron sheets should always be used.

11. When service encountered is severe and the material used may be subjected to rapid deterioration, either from abrasion or excessive corrosion, heavier gages of materials than ordinarily used are recommended.

12. In exposed work the same method of formation should be used throughout. All visible work should present a neat and workmanlike appearance.

13. Accompanying table gives recommended gages of galvanized iron or steel sheets used for ducts, both rectangular and round:

ROUND DUCTS DIAMETER, IN.	GAGE U. S. STANDARD	RECTANGULAR DUCTS WIDTH, IN.
6 in. to 19 in.	No. 26 gage	4 in. to 18 in.
20 in. to 29 in.	No. 24 gage	19 in. to 30 in.
30 in. to 39 in.	No. 22 gage	31 in. to 60 in.
40 in. to 49 in.	No. 20 gage	61 in. to 118 in.
50 in. and above	No. 18 gage	120 in. and above

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.

The quantity, velocity, and pressure of air discharged by a fan or flowing through a pipe may be determined by various methods. An anemometer is used where accuracy is not required and where air velocities not over 600 ft. per minute are to be measured, as at registers. For the greatest measure of reliability the anemometer shall have been newly calibrated, and correction shall be made for the error as shown by the calibration.

The standard method for measuring air velocity and pressure shall be the Pitot Tube as described in the A. S. H. & V. E. Standard Code for the Testing of Centrifugal and Disc Fans (TRANS., A. S. H. & V. E., Vol. 29, 1923, p. 407.) Installation tests for determination of fan capacity and efficiency shall be under laboratory conditions, in accordance with this Code.

CHAPTER XXIX

AIR CLEANERS

Types of Air Cleaners, Air Washers, Temperature and Humidity Control, Steam Required for Air Washers and Humidifiers, Viscous Filters, Efficiency in Dust Removal.

IN the selection of a suitable air cleaning device the engineer is guided largely by the character and amount of the impurities to be removed. While almost every conceivable substance enters into the composition of dust, by far the most objectionable and destructive components are soot, flue dust, carbon and its related elements. The impurities in the air may be classified as dusts, fumes and smokes.

Dusts are particles which are large and heavy enough to fall with increasing rapidity due to gravity in still air. For instance, particles of flying sand or grit, such as are blown about on a windy day, the average diameter of which would be approximately 0.01 cm., are called dust.

Fumes are smaller particles which fall with constant velocity due to gravity in still air. The solid particles from atmospheric fog, for instance, are called fumes and have an average diameter in the neighborhood of 0.0014 cms.

Smokes are particles which do not settle at all in still air, which diffuse constantly, and which are actuated by the Brownian motion rather than by gravity. An example of this type would be certain smokes, the average diameter of the particles of which is in the neighborhood of 0.0000015 cms.

The first attempt at air cleaning for general ventilation work was probably by the use of dry screens. Since ordinary Portland cement all passes a screen having 100 mesh to the inch, it is apparent that much dust may pass the finest mesh screen. When a screen as fine as this is moistened, not only the dirt ceases to pass but also the air passages clog up so that the filter becomes ineffective. Fine cloth filters were then tried and found very effective, except that they also clog up rapidly and soon become impervious to air. These considerations led many years ago to the development of the air washer types of air cleaners.

TYPES OF AIR WASHERS

Air washers are arranged to bring the air into contact with a large water area: (1) by passing it through a fine spray; (2) by passing it over

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