

perature range, pressure loss in ducts, etc. Pressure losses build up rapidly as velocities are increased and generally they vary approximately as the square of the velocity. The allowable pressure loss through the heater should in general not exceed 50 per cent of the total static pressure of the system. In public building practice the allowable pressure loss through tempering coils and reheaters should be under 0.5 in. of water and when an air cleaner is used the friction through the tempering coil and reheater should not exceed 40 per cent of the total resistance, as a rule.

For data on the design and construction of duct systems for ventilating work, see Chapter 27.

A greater friction allowance for the heaters than 50 per cent of the total may be made in industrial work where the duct runs are comparatively short and where the resistance of the heater is a large part of the entire pressure loss in the system.

The fan may be selected when the following facts are known:

1. Quantity of air required in cubic feet per minute.
2. Static pressure of the system (ducts, heaters, air cleaners, entrance connections, etc.)

The rating used for the fan should have been determined by the A. S. H. V. E. Standard Code for Testing Centrifugal and Disc Fans (See TRANSACTIONS, 1923, Vol. 29, p. 407 and Chapter 26).

A mechanical ventilation installation rightly designed and operated will be quiet and efficient, but every precaution should be taken to prevent vibration or sound transmission to the rooms.

It is usually more effective to float both fan and motor on a base common to both on cork, including its foundations, than to attempt to isolate each separate apparatus. There are several systems for sound-proofing of machinery available and contracts may be made covering assured results.

EQUIPMENT FOR ATTAINING SYNTHETIC AIR CHART PERCENTAGES

The following classifications are given to assist in selecting the type of equipment necessary to attain certain percentages on the Synthetic Air Chart described in Chapter 3. It will be understood that considerable variation may be found in certain classes of equipment due to individual ideas on the part of the designer, the character of the workmanship, the location of the building in which the equipment is installed, etc.; nevertheless, if the equipment is properly designed, installed and operated, it will give at least the percentage listed under any particular classification. To design an installation approaching 100 per cent, it is necessary to provide apparatus for heating and humidifying the air, and for cleaning it and distributing it with controlling devices that will maintain the temperature and humidity in conformity with the comfort lines as given by the Research Laboratory of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS. Any equipment omitted or any part that is ineffective will reduce the final percentage attained.

Class "A" equipment capable of attaining over 95 per cent on the

Synthetic Air Chart, consisting of a mechanical system including the following apparatus:

1. Mechanical air supply having a maximum capacity of 30 cu. ft. per minute per occupant.
2. Mechanical exhaust equipment.
3. Excellent air distribution.
4. Accurate automatic temperature control.
5. Efficient humidifying apparatus.
6. Accurate automatic humidity control devices.
7. Efficient air cleaning apparatus.

Note.—It is understood that 100 per cent efficiency is a physical impossibility since this would mean 100 per cent efficiency in the air cleaning device, in air distribution, in temperature control, etc. Perfect results of this kind have not yet been obtained in practice, although it is possible to obtain approximately 99 per cent of the Synthetic Air Chart with an apparatus of this kind carefully designed and installed and skillfully operated.

Class "B" equipment capable of attaining from 90 to 95 per cent on the Synthetic Air Chart, consisting of a mechanical system including the following apparatus:

1. Mechanical air supply having a maximum capacity of 30 cu. ft. per minute per occupant.
2. A well designed gravity exhaust system.
3. Efficient air distribution by properly located supply and exhaust openings.
4. Automatic temperature control.
5. Adequate humidifying apparatus.
6. Automatic humidity control.

Note.—All cleaning devices have been omitted from Class "B" as 95 per cent can be obtained under ordinary conditions without air cleaning. In exceptionally clean localities higher percentages will result. Where the air contains considerably more than the average amount of dust slightly lower percentages may result. Air cleaning apparatus may be substituted in Class "B" for automatic humidity control without materially affecting the final percentage.

Class "C" equipment capable of attaining from 85 to 90 per cent on the Synthetic Air Chart, consisting of a mechanical system including the following apparatus:

1. Mechanical air supply having a maximum capacity of 30 cu. ft. per minute per occupant.
2. Gravity exhaust.
3. Efficient air distribution by properly located supply and exhaust openings.
4. Automatic temperature control.
5. Adequate humidifying apparatus.
6. Humidity control from one or more selected points or manual control.

Class "D" equipment capable of attaining 80 to 85 per cent on the Synthetic Air Chart, consisting of a mechanical system including the following apparatus:

1. Mechanical supply having a maximum capacity of 30 cu. ft. per minute per occupant.
2. Gravity exhaust.
3. Good air distribution.
4. Automatic temperature control from one or more selected points or manual control.