

ignition of the gas or vapor surrounding the motor by sparks, flashes, or explosion of the gas or vapor which may occur within the machine casing.

Water Proof motors (55 C rise) are so constructed as to exclude water applied in the form of a stream from a hose.

Dust Tight motors (55 C rise) are so constructed that the enclosing case will exclude dust.

Motor Speed Classifications

A *Constant Speed Motor* is one in which the speed remains practically constant with changes in load; e.g., a d-c shunt wound motor or a-c squirrel-cage motor with low slip.

A *Varying Speed Motor* is one in which the speed varies with the load, usually decreasing when the load increases; e.g., a d-c series motor or an induction motor with large slip.

An *Adjustable Varying Speed Motor* is one in which the speed can be adjusted gradually, but when once adjusted for a given load will vary in considerable degree with change in load; e.g., a shunt wound d-c motor adjusted by armature resistance control.

An *Adjustable Speed Motor* is one in which the speed can be varied gradually over a considerable range, but when once adjusted remains practically unaffected by the load; e.g., a d-c shunt motor with field resistance control. The standard ratings for open type, adjustable speed motors, having a speed range of 3 to 1 and greater are in accordance with the following:

- (1) A standard continuous horsepower rating at 150 per cent of minimum speed with a temperature rise of 40 C.
- (2) The next higher standard continuous horsepower rating at 3 times minimum speed with a temperature rise of 40 C.
- (3) Between 150 per cent of minimum speed and 3 times minimum speed, the standard continuous horsepower rating with a temperature rise of 40 C will vary with the speed along a straight line connecting these two horsepower ratings. No further increase in horsepower is recognized above 3 times minimum speed.
- (4) Below 150 per cent of minimum speed the lower continuous horsepower rating (see preceding item 1) will apply with a temperature rise of 50 C.
Example: 20/25 hp, 400 to 1600 rpm. This motor may be rated 20 hp, 40 C at 600 rpm and 25 hp, 40 C from 1200 to 1600 rpm. Between 600 and 1200 rpm the rated horsepower increases directly with speed from 20 to 25 hp.
- (5) Motors may also be rated 1 hour with temperature rise of 50 C with the higher horsepower rating (see preceding item 2) throughout the entire speed range.
Example: 20/25 hp, 400 to 1600 rpm. This motor may be rated 25 hp, 50 C, 400/1600 rpm; 1 hour.

Mechanical Modifications

Vertical Mountings are available for such applications as pumps, agitators, and so forth. This type of application may require a special umbrella-type hood to protect against dripping liquids.

Flanged Mountings are available for use where motors are built in as part of machines. Motors may also be supplied with flush plate mountings, suitable for close coupled pump and similar applications.

Unit Air Conditioners, Unit Air Coolers, Attic Fans

Definition of Types, Unit Air Conditioners, Heating, Humidifying, Cooling and Dehumidifying, Filtering, Ventilating, Types of Units, Application, Ratings, Unit Air Coolers, Design and Performance, Types of Units, Ratings, Defrosting, Economics, Attic Fans

AN assembly of functional elements, as indicated by the name, comprises the unit air conditioner or unit air cooler. Such a unit when complete in itself, employing its own direct means of air distribution and source of refrigeration is known as a self-contained unit. When used in various combinations with remote sources of refrigeration, heat or air supply, it is termed a remote unit, indicating that the source of refrigeration is not contained within the unit cabinet. Either the self-contained or remote type units may be located within or without the conditioned area, and are a separate classification from the central plant type of system, as described in Chapter 43.

The code, Standard Method of Rating and Testing Air Conditioning Equipment¹, defines the various types of unitary equipment:

1. A *Cooling Unit* is a specific air treating combination consisting of means for air circulation and cooling within prescribed temperature limits.
2. An *Air Conditioning Unit* is a specific air treating combination consisting of means for ventilation, air circulation, air cleaning and heat transfer with control means for maintaining temperature and humidity within prescribed limits.
3. A *Cooling Air Conditioning Unit* is a specific air treating combination consisting of means for ventilation, air circulation, air cleaning and heat transfer with control means for cooling and maintaining temperature and humidity within prescribed limits.
4. A *Self-Contained Air Conditioning or Cooling Unit* is one in which a condensing unit is combined in the same cabinet with the other functional elements. Self-contained air conditioning units are classified² according to the method of rejecting condenser heat (water cooled, air cooled, and evaporatively cooled), method of introducing ventilation air (no ventilation, ventilation by drawing air from outside, ventilation by exhausting room air to the outside, or ventilation by a combination of the last two methods), and method of discharging air to the room (free delivery or pressure type).
5. A *Free Delivery Type Unit* takes in air and discharges it directly to the space to be treated without external elements which impose air resistance.
6. A *Pressure Type Unit* is for use with one or more external elements which impose air resistance.
7. A *Forced-Circulation Air Cooler* is a factory encased assembly of elements by which heat is transferred from air to evaporating refrigerant³.

UNIT AIR CONDITIONERS

This equipment takes the form of an encased assembly including the apparatus necessary to perform either some or all of the functions of cooling, dehumidifying, filtering, ventilation, air circulation, heating, and humidifying. Control of air conditions is provided by manual switches, manual dampers, and automatic devices, in combination. The controls are either mounted on the units, or in some suitable location in the conditioned area. See Chapter 34 for a discussion of controls.

The various conditioning elements and their functions, which produce the required effects on air, are discussed under separate headings.

Heating

Heating is usually accomplished by means of a heating coil in the unit,