remote from the motor equipment are sometimes found, due to such noises being carried by the steel work, ducts, or piping in the building. There is considerable evidence that these sounds are more easily controlled with higher motor speeds than with lower motor speeds.

Motors which are practically quiet in operation and free from magnetic disturbing noises can be obtained and should always be specified for quietness of operation when used for fan installations in buildings where quietness is a factor.

In the construction of fan and motor foundations where the machinery is mounted on the floor or upon a concrete platform, it is a usual practice to install a layer of cork on top of which is laid or floated the base which carries the apparatus. It is essential that the bolts or lag screws which

TABLE 2. CLASSIFICATION OF MOTORS

GROUP	SUB. DIV.	TYPE	CURRENT	SPEED CHARACTERISTICS	STARTING TORQUE	STARTING CURRENT	APPLICATIONS
A	1	Shunt Wound	d-c	Constant	Medium	High	Fans
	2	Squirrel Cage	a-c	Constant	Medium	High — About six times full load	Fans, Centrifugal Pumps
	3	Synchronous	a-c	Constant	Medium	Starts as Squirrel Cage Motor	Motor Generator Sets, Air Compressors, Fans
	4	Slip Ring or Wound Rotor	a-c	Constant	Heavy	Low	Vacuum Pumps, Air Compressors
	5	Double Squirrel Cage	a-c	Constant	Heavy	Medium	Frequent and Heavy Starting Loads, Pumps, Compressors
B	1	Brush Shifting	a-c	Adjustable	Medium	Low	Stokers, Boiler Fans
	2	Cumulative Comp'd with Shunt Predominance	d-c	Adjustable	Heavy	High	Pumps
	3	Squirrel Cage Poles can be Regrouped	a-c	Multi-Speed	Medium	High	Fans, Ice Machines
C	1	Series	d-c	Variable	Heavy	Low	Fans
	2	Cumulative Comp'd with Series Predominance	d-c	Variable	Heavy	Low	Single Acting Reciprocating Pumps
	3	Slip Ring—Using External Resistance in Secondary	a-c	Variable	Heavy	Low	Fans

fasten the machines to this foundation shall not extend through to the floor. It is wise to fasten curbs to the floor, these presenting insulated surfaces to the machinery foundation and so preventing it from traveling. The general classification of motors used for heating, ventilation and air conditioning is shown in Table 2.

Control for Electric Motors

Very small direct current motors may be started by throwing them directly on the line through a suitable starting switch. The larger sizes require some type of starting rheostat. When speed adjustment is desired, the controller for adjusting the speeds of the motor usually functions also as a starting device.

Alternating current motors of 5 hp and under, usually may be thrown directly on the line. It is good practice to use a starting switch equipped with a thermal overload or inverse time limit overload device. This type of switch provides protection to the motor beyond the power of fuses to supply. Fuses when used necessarily must be large enough to take care of the inrush current which makes them inadequate for protecting the motor under operating conditions. The thermal overload device allows for this inrush and does not function until an overload has become persistent, the time element depending upon the percentage of overload over the rating of the element.

This type of switch is available for manual operation and also is furnished in the magnetic type for remote operation by push-button, or for operation by other types of pilots such as pressure switches and thermostats.

On the standard squirrel cage motors above 5 hp a starting compensator usually is employed to keep the inrush current to within the limits specified by the local power companies. Compensators may be obtained in transformer type and primary resistor type, and usually are furnished for manual operation. They can be secured for remote control also, but are necessarily expensive. However, the new type of high reactance, self-starting motors, may usually be thrown across the line up to 30 hp in size, and still have their inrush current within the limits of the rules of *National Electric Light Association*. With this type of motor a magnetic contactor usually is used. This device may be operated from a remote point by push-button, if desired. These magnetic contactors are furnished usually with thermal overload and no-voltage protection.

For remote operation of motors through magnetic starters, the operating buttons may be located in the engineer's or manager's office, and tell-tale indicating lamps may be wired up with the circuit to indicate whether or not the unit is in operation.

This type of control is very desirable in large buildings where the engineer is to have complete charge of the ventilating system.

Remote or automatic control of the units may be effected also by pneumatic or hydraulic apparatus, or by thermostats or by pressure devices which are provided with electric contacts for starting or stopping the units upon reaching certain conditions.

Variable speed slip ring motors and direct current motors may also be arranged for remote speed control by means of pre-set automatic