

circuit during starting which is disconnected through the action of a centrifugal switch as the motor comes up to speed. Under running conditions, it operates as a single phase induction motor with one winding in the circuit. These units are available for the lower horsepower ratings and when equipped with a high slip rotor may be used for adjustable varying speed through line voltage control.

Polyphase Motors

Squirrel-cage induction motors are available in four types; three of

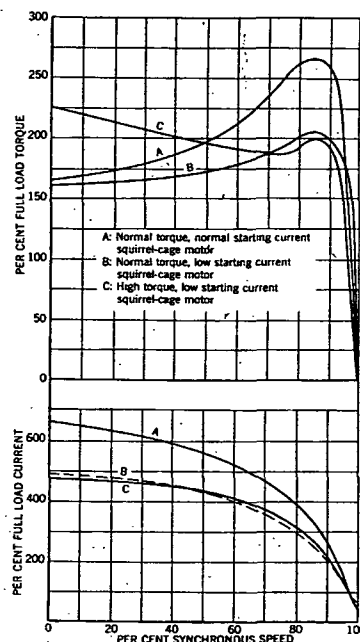


FIG. 2. COMPARATIVE CURVES OF SQUIRREL-CAGE INDUCTION MOTORS

which are normally used in heating, ventilating, and air conditioning applications, and in a full range of sizes:

1. The normal torque, normal starting current squirrel-cage motor has close speed regulation, high efficiency, high power factor, medium starting torque; high pull-out torque, and is suitable for general purpose applications. This motor has a large current inrush and a low starting power factor. When central stations require current limiting starting equipment on such motors, the starting torque is less.

2. The normal torque, low starting current squirrel-cage motor has approximately the same torque as the normal current motor, but the starting current is about 20 per cent less than the normal torque motor on full voltage and ordinarily within most power companies locked rotor current limits on sizes up to 30 hp.

This motor lends itself to automatic or remote control because no current limiting starting equipment is necessary up to and including 30 hp. A magnetic starter with low voltage and thermal relay overload protection gives the most satisfactory service.

3. The high torque, low current squirrel-cage motor has a starting torque approximately 25 to 50 per cent greater than the normal torque motor on full voltage with starting current approximately equal to the normal torque low starting current motor started on full voltage and within the required limits on 30 hp sizes and smaller. These motors are also started directly across-the-line on full voltage through a magnetic starter or other approved starting device.

Typical speed torque and speed current curves for the three types of motors in the integral horsepower size are shown in Fig. 2. A speed torque curve for a fractional horsepower size motor of the polyphase

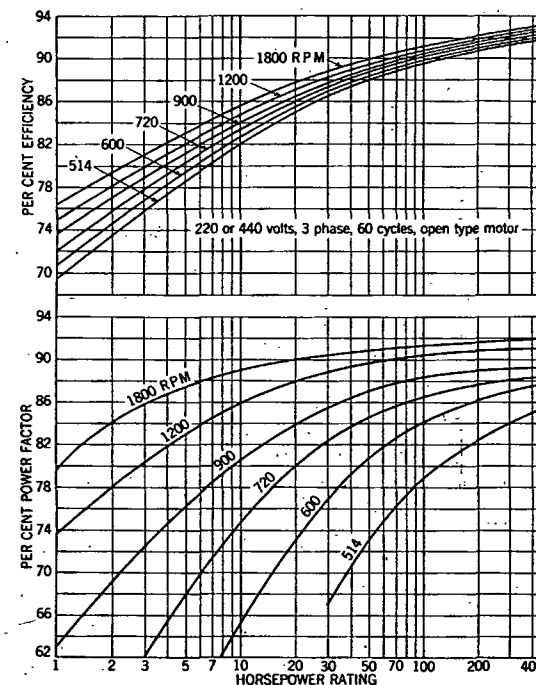


FIG. 3. EFFICIENCIES AND POWER FACTORS FOR SQUIRREL-CAGE INDUCTION MOTORS

type is given in Fig. 1. Some of the motor manufacturers have taken definite steps to combine the normal torque, normal starting current motor, with the normal torque low-starting current motor, and supplying one type of motor with normal torques and a starting current between the normal and low-starting current values now used.

These three types of motors are also available in two, three, or four speed designs with variable torque, constant torque, or constant horsepower characteristics. Two speed motors may be either single, or two winding; three speed motors are two winding; and four speed motors are two winding. When a motor can be wound with a winding for each speed, better operating characteristics may be obtained because no