Typical Specifications for D-C Motors

.....Hp, ...RPM, {Constant / Adjustable / Varying} Speed,

{Shunt / Compound / Series} Wound, {115 / 230 / 600} Volts D-C Motors

For Driving ..... Motor Shall
(Application)

Be Arranged For {Horizontal / Vertical} Mounting And Shall

Be Provided With A.....
(Open, Splashproof, etc.)

Type Of Enclosure, *NEMA* {Class A / Class B} Insulation,

And {Ball / Sleeve} Bearings.

Typical Specifications for D-C Motor Control

Control For {Constant / Adjustable / Adjustable Varying} Speed D-C

Motors Shall Be {Manual / Magnetic} And Shall Consist of

a Safety Switch And an Enclosed Controller Providing

Overload Protection [And Low Voltage {Protection / Release}].

Typical Specifications for Squirrel-Cage Motors

.....Hp, ...RPM, {25 / 60} Cycles,

{208 / 220 / 440 / 550} Volts, {2 / 3} Phase, Squirrel-Cage Induc-

tion Motors of the *NEMA*

{Class A—Normal Starting Torque, Normal Starting Current / Class B—Normal Starting Torque, Low Starting Current / Class C—High Starting Torque, Low Starting Current / Class D—High slip} Type

Driving..... Motor shall
(Application)

Be Arranged For {Horizontal / Vertical} Mounting And Shall

Be Provided With A.....
(Open, Splashproof, etc.)

Type of Enclosure, *NEMA* {Class A / Class B} Insulation,

And {Sleeve / Ball} Bearings.

the constant speed motor with the exception that the starting resistor must be designed for speed regulating duty which means that it must be capable of carrying the motor current continuously. Speed controllers are available both for constant torque applications and varying torque drives, such as required by fans, in which the torque is reduced considerably at reduced speed.

The *Adjustable Voltage* type of speed control is also often known as the variable voltage or Ward-Leonard system. For machines requiring a wide range in speed control and a large number of steps of control this type of system is used most extensively. The drive consists of one or more d-c motors, the armatures of which are supplied with power from a d-c generator and the fields of all machines are excited from a constant

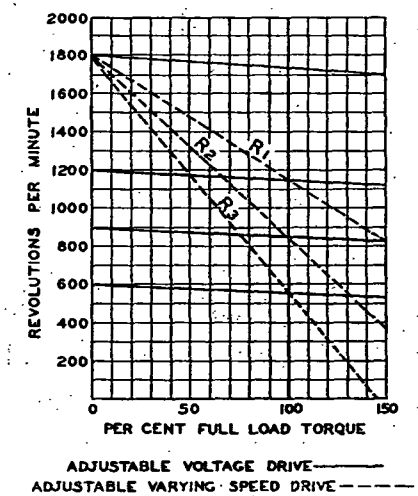

FIG. 3. SPEED TORQUE CHARACTERISTICS OF ADJUSTABLE VARYING SPEED DRIVE AND ADJUSTABLE VOLTAGE DRIVE

voltage exciter. A schematic diagram of connections for an adjustable voltage drive is shown in Fig. 4. In most cases the d-c generator is a part of a three-unit set including a constant speed a-c driving motor, and a constant voltage exciter. As the voltage on the generator and consequently on the d-c motor or motors is adjusted by a rheostat in the generator field circuit, a great many steps are thus obtained in an efficient manner. With constant field excitation on the motor the speed of the motor will vary approximately as the voltage on the generator.

Extremely wide speed ranges are possible with the adjustable voltage type of drive. Ranges as high as 10 to 1 are common and by the addition of field control on the motors ranges as high as 40 to 1 are permissible. This type of drive provides the advantage of good speed regulation over the entire speed range, as shown in Fig. 3 in which this type of drive is compared with the adjustable varying speed drive.

Typical specifications for d-c motor control are shown on page 634.