TABLE 1. CLASSIFICATION OF MOTORS

Power Supply	Type	Speed Characteristics	Full Voltage		HP Range	Type of Application See Footnote†
			Starting Torque	Starting Current		
Constant Speed Drives						
D-C	1. Shunt	Constant	Normal	Normal (with controller)	All	(a) Fans and (c) centrifugal pumps and centrifugal compressors
	2. Compound	Variable	High	Normal (with controller)	All	(b) (c) (e) Reciprocating pumps and frequent or hand starting
	3. Series	Variable	High	Normal (with controller)	Small	(d) Fans direct connected
Poly-phase A-C	4. Squirrel-Cage General Purpose Class A	Constant	Normal 0.8–1.5 times	High 6–8 times	All	(a) Fans and (c) centrifugal pumps and centrifugal compressors
	5. Squirrel-Cage Class B	Constant	Normal 0.8–1.5 times	Normal 5–6 times	Medium Small	(a) Fans and centrifugal pumps and centrifugal compressors
	6. Squirrel-Cage Class C	Constant	High 2–2.6 times	Normal 5–6 times	Medium Small	(b) Reciprocating pumps (c) and compressors started loaded
	7. Wound Rotor	Constant or Variable	High 1–2.5 times	Low 1–3 times with secondary control	All	(a) Hoists (b) reciprocating pumps and compressors (c) and frequent (e) or hand start
	8. Synchronous High Speed	Exactly Constant	Normal 0.75–1.75 times	Normal 5–7 times	Medium Large	(a) Fans and centrifugal pumps and centrifugal compressors
	9. Synchronous Low Speed	Exactly Constant	Low 0.3–0.4 times	Low 3–4 times	Medium Large	(a) Reciprocating compressors starting unloaded
Single Phase A-C	10. Capacitor	Constant	High	Normal	Small	(b) Pumps and compressors
	11. Capacitor Fan	Constant	Normal	Normal	Small	(a) Fans, centrifugal pumps
	12. Capacitor Start Induction Run	Constant	High	Normal	Small Fractional	(a) Fans (b) pumps and compressors
	13. Repulsion Induction	Constant	High	Normal	Medium Small	(a) Fans (b) pumps and compressors
	14. Split Phase	Constant and Adjustable	Normal	Normal	Fractional	(a) Fans (b) pumps and compressors (d) fans—direct

†Applications:

a. Drives having medium or low starting torque and inertia (WR^2) such as fans and centrifugal pumps or reciprocating pumps and compressors started unloaded.

b. Drives having high starting torques, such as reciprocating pumps and compressors started loaded.

c. Similar to (*a*) except where frequent or hand starting (large WR^2) requires a higher starting and accelerating torque.

d. Fans direct connected.

e. Stoker drives.

TABLE 1. CLASSIFICATION OF MOTORS—(Concluded)

Power Supply	Type	Speed Characteristics	Full Voltage		HP Range	Type of Application See Footnote†
			Starting Torque	Starting Current		
Adjustable Speed Drives						
D-C	15. Shunt Field Adjustment	Constant	Normal	Normal (with controller)	All	(a) Fans and (e) centrifugal pumps
	16. Armature Resistance Adjustment	Variable	Normal	Normal (with controller)	All	(a) Fans and (e) centrifugal pumps
	17. Variable Voltage Control	Constant	Normal	Normal	All	(d) Fans and centrifugal pumps
Poly-phase A-C	18. Squirrel-Cage High Slip, Transformer Adjustment	Variable	Normal	Normal	Medium Small	(a) Fans
	19. Squirrel-Cage Separate Winding or Regrouped Poles	Constant Multi-Speed	Normal or High	Normal or Low	All	(a) Fans (b) pumps and (c) compressors
	20. Wound Rotor, External Secondary Resistance	Variable	High	Low	All	(a) Fans (b) centrifugal pumps and compressors
Single Phase A-C	21. Repulsion	Variable	High	Normal	Low and Fractional	(a) Fans—centrifugal pumps (b) compressors
	22. Capacitor Low Torque Tapped Winding	Variable Two Speed	Low	Normal	Fractional	(d) Fans, direct
	23. Capacitor Low Torque Transformer Adjustment	Variable	Low	Low	Fractional	(d) Fans
	24. Split Phase Regrouped Poles	Constant	Normal	Normal	Fractional	(d) Fans

DIRECT CURRENT MOTORS

Direct current motors are classified (see Table 1) under three headings, depending on the type of winding: *shunt wound*, *compound wound*, and *series wound*.

Shunt Wound motors, being suitable for application to fans, centrifugal pumps, or similar equipment where the amount of starting torque required is relatively small, are used for the majority of direct current applications in the field of heating, ventilating, and air conditioning. They may be used on reciprocating pumps and compressors if started under unloaded conditions.

Without auxiliary control the shunt wound motor is designated as *constant speed*.* Fig. 1 illustrates the characteristics of direct current motors, showing speed, horsepower, and torque as a function of current. The speed regulation* of small size shunt wound motors from ¾ hp to 5 hp is 12 per cent as specified by the *NEMA* while on larger motors it is 10 per cent.

*Refer to Glossary at end of chapter.