Leaving Air: Humidity, $H = 0.0355$ lb water vapor per pound dry air.
Per Cent Humidity, $\%H = 32$

Water pick up $= 0.0355 - 0.01 = 0.0255$ lb per pound bone dry air.

Bone dry air circulated per hour $= 250 \div 0.0255 = 9800$ lb.

Volume of air circulated at 80 F dry-bulb, and 46 per cent humidity
14.1 − 13.6 = 0.5 cu ft vapor (Fig. 4).

Volume $= 13.6 + (0.46 \times 0.5) = 13.87$ cu ft = 1 lb dry air + vapor.

Volume handled by fan at 80 F $= \dfrac{9800 \times 13.87}{60} = 2260$ cfm.

Btu received by water $= (130 - 70) \times 1.0 = 60$

Latent heat of steam at 130 F (Fig. 4) = 1019

Total = 1079 Btu per pound.

Heat used for evaporation per pound dry air $= 1079 \times 0.0255 = 27.43$ Btu.

For entering air: Humidity, $H = 0.01$, Humid Heat = 0.2425 Btu per pound (Fig. 4)

$(t_1 - t_2) \times S$ = Btu for evaporation
$(t_1 - 130) \times 0.2425 = 27.43$
$t_1 = 247$ F.

6 ● Given the following conditions, air 160 F dry-bulb, 49.6 per cent relative humidity (Φ), 29.92 in. Hg, barometric pressure, find the per cent H, absolute humidity.

For 160 F, $p_s = 9.65$ in. Hg (From Table 6, Chapter 1)

$p = \Phi p_s = 0.496 \times 9.65 = 4.78$

$\dfrac{29.92 - 9.65}{29.92 - 4.78} \times 0.496 = 0.40$ or 40 per cent absolute humidity.

Chapter 42

MOTORS AND CONTROLS

Direct Current Motors, Alternating Current Motors for Single Phase and Polyphase, Special Applications, Classification of Motors, Manual Control, Automatic Control, Pilot Controls, Direct Current Motor Control, Squirrel Cage Motor Control, Multispeed Motor Control, Slip Ring Motor Control, Single Phase Motor Control

THE electric motor, available in many different types suitable for various services, is now the most widely used form of prime mover. The equipment for starting, controlling and protecting these motors varies with the type and with the functions it is desired to attain. Motors used for heating, ventilating and air conditioning applications may be divided into two general classifications as follows:

1. For use with direct current.
2. For use with alternating current.

DIRECT CURRENT MOTORS

There are three types of direct current motors available:

1. Shunt Wound.
2. Compound Wound.
3. 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 applications in the field of heating, ventilating and air conditioning. They may be used on reciprocating pumps and compressors, if started under unloaded conditions.

Compound Wound motors are required for application to compressors, stokers, reciprocating pumps when started under loaded conditions, and also when applied to similar equipment where high starting torque is required. Whenever frequent starting makes high starting and accelerating torque desirable, or where sudden changes of load are encountered, compound wound motors are used.

Series Wound motors find only limited application in a few special cases and are available in only a limited range of sizes.