Search for Power for Different Motor Phases and select the formula for specifying the current for a 3-phase motor where the power consumed in KW is known.

$$I_{amps} = \frac{P_{KW}\left(1000\frac{W}{KW}\right)}{\sqrt{3}V\left(pf\right)} = \frac{\left(8.03KW\right)\left(1000\frac{W}{KW}\right)}{\sqrt{3}\left(208V\right)\left(0.9\frac{W}{VA}\right)} = 24.8A$$

Select the circuit breaker the next size up. An undersized breaker will trip anytime the motor draws its full load current, therefore it is not appropriate to round down.

Answer B

45.13 $90°F$, 20% relative humidity air is cooled using a 75% effective evaporative cooler. What is the temperature of the air after being cooled?

A. $55°F$

B. $63°F$

C. $70°F$

D. $76°F$

The effectiveness of an evaporative cooler is given by the formula below where t_1 represents the entering air dry bulb temperature, t_2 represents the leaving air dry bulb temperature, and t'_s is the wet bulb temperature of the entering air. The wet bulb temperature is the minimum temperature which could theoretically be achieved in a 100% efficient evaporative cooler.

$$\varepsilon_e = \frac{t_1 - t_2}{t_1 - t'_s}$$

Use the Psychrometric Chart to find the wet bulb temperature of the entering air.

$$t_1 = 90°F$$

$$\phi = 20\%$$

$$t'_s = 62.8°F$$

Substitute into the effectiveness formula and solve for t_2.

$$0.75 = \frac{90°F - t_2}{90°F - 62.8°F}$$

$$t_2 = 69.6°F$$

Answer C

45.14 A company is considering whether to invest in a piece of equipment that will have an initial cost of $100,000 and will produce $50,000 per year in revenue for the next 3 years before maintenance costs and taxes. Maintenence will cost $5000 per year. The tax rate is 30% and straight line depreciation is used for the equipment. The equipment has a salvage value of $20,000 to be realized at the end of year 3. What is the present value of the initiaitve using a 10% rate of return?

A. -$62K

B. $18K

C. $46K

D. $211K

Draw a cash flow diagram and make a list of cash flows.

Year 0: -$100K

Years 1 & 2: Revenue = 50K and Cost = 5K. The profit before tax is 45K. The taxes may be addressed separately.

Year 3: The cash flow is the same as for years 1 & 2 except for an additional $20K in salvage value which will be included a separate one-off future payment.

For tax purposes, the profit which is considered taxable is reduced by the depreciation for that year even though the cash was actually spent in year 0. For straight line depreciation, the depreciated amount for years 1, 2, and 3 is the same.

$$D = \frac{\$100,000}{3 years} = \$33,333\, per\ year$$

Determine the profit for tax purposes.

$$Profit = Revenue - (Expenses + Depreciation)$$

$$Profit = \$50,000 - (\$5,000 + \$33,333) = \$11,667$$

Apply the tax rate to determine the tax liability.

$$Tax = (\$11,667)\,(0.3) = \$3,500$$

Subtract the tax from the before-tax profit (excluding depreciation) to determine the after-tax profit. This is the net cash flow for years 1 & 2.

$$After\ tax\ Profit = \$45,000 - \$3,500 = \$41,500$$

For year 3, the salvage value, which is not subject to taxes, will be handled as a separate future payment in our present value calculation. In other words, the $41,500 will be considered part of an annualized cash flow with a 3 year period.