Voltage-Drop Calculations

Unit 8

8.2 Conductor Resistance—Direct-Current Circuits [Chapter 9, Table 8]

The NEC lists the resistance and area in circular mils for both dc and ac circuit conductors. Direct-current circuit conductor resistances are listed in Chapter 9, Table 8, and alternating-current circuit conductor resistances are listed in Chapter 9, Table 9. The tables include both solid and stranded conductors. Stranded conductors will be used in this textbook unless specified otherwise.

The dc conductor resistances listed in Chapter 9, Table 8 apply to conductors 1,000 ft long. The following formula can be used to determine the conductor resistance for conductor lengths other than 1,000 ft:

\[
\text{DC Conductor Resistance} = \left( \frac{\text{Conductor Resistance Ohms}}{1,000 \text{ ft}} \right) \times \text{Conductor Length}
\]

**Conductor Resistance Copper**

*Question:* What is the dc resistance of 200 ft of 12 AWG copper?

(a) 0.21 ohms  
(b) 0.29 ohms  
(c) 0.396 ohms  
(d) 0.72 ohms

*Answer:* (c) 0.396 ohms

The dc resistance of 12 AWG copper 1,000 ft long is 1.98 ohms [Chapter 9, Table 8].

The dc resistance of 200 ft is:

\[(1.98 \text{ ohms}/1,000 \text{ ft}) \times 200 \text{ ft} = 0.396 \text{ ohms}\]