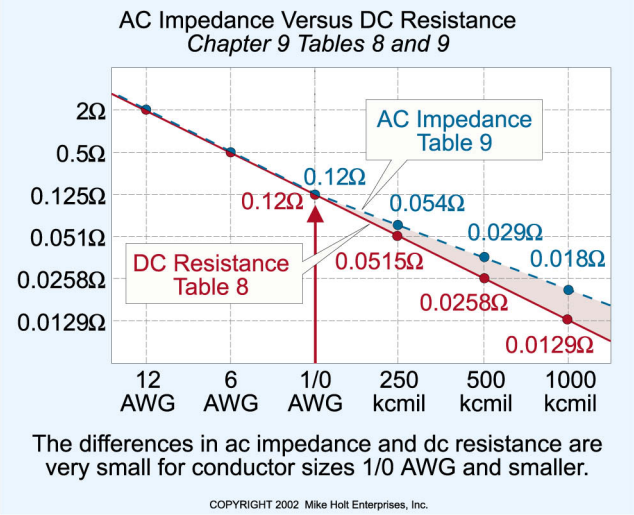

Figure 8-5
Conductor Resistance

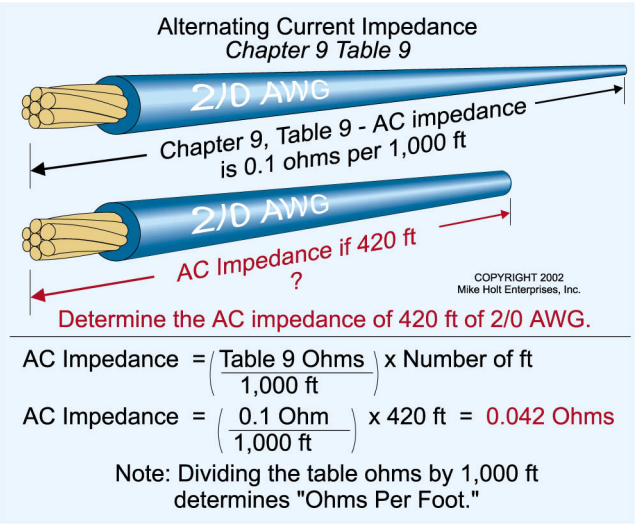

Figure 8-6
Alternating-Current Impedance

COPPER – Alternating-Current Impedance versus Direct-Current Resistance at 75°C			
Conductor Size	**AC Impedance Chapter 9, Table 9**	**DC Resistance Chapter 9, Table 8**	**AC impedance greater than dc resistance by %**
250,000	0.054Ω per 1,000 ft	0.0515Ω per 1,000 ft	4.85%
500,000	0.029Ω per 1,000 ft	0.0258Ω per 1,000 ft	12.40%
1,000,000	0.018Ω per 1,000 ft	0.0129Ω per 1,000 ft	39.50%
ALUMINUM – Alternating-Current Impedance versus Direct-Current Resistance at 75°C			
Conductor Size	**AC Impedance Chapter 9, Table 9**	**DC Resistance Chapter 9, Table 8**	**AC impedance greater than dc resistance by %**
250,000	0.086Ω per 1,000 ft	0.0847Ω per 1,000 ft	1.5%
500,000	0.045Ω per 1,000 ft	0.0424Ω per 1,000 ft	6.13%
1,000,000	0.025Ω per 1,000 ft	0.0212Ω per 1,000 ft	17.12%

8–5 IMPEDANCE [Chapter 9, Table 9 of The NEC]

An alternating-current conductor's opposition to current flow (resistances and reactance) is listed in Chapter 9, Table 9 of the *NEC*. The total opposition to current flow in an ac circuit is called impedance and this is dependent on the conductor's material (copper or aluminum) and on the magnetic property of the raceway or cable they are installed within.

❑ Alternating-Current Ohms-to-Neutral Impedance Per 1,000 Ft

What is the ac ohms-to-neutral impediance of 250,000 cm that is 1,000 ft long?

Copper conductor in nonmetallic raceway	= 0.052Ω
Copper conductor in aluminum raceway	= 0.057Ω
Copper conductor in steel raceway	= 0.054Ω
Aluminum conductor in nonmetallic raceway	= 0.085Ω
Aluminum conductors in aluminum raceway	= 0.090Ω
Aluminum conductors in steel raceway	= 0.086Ω