

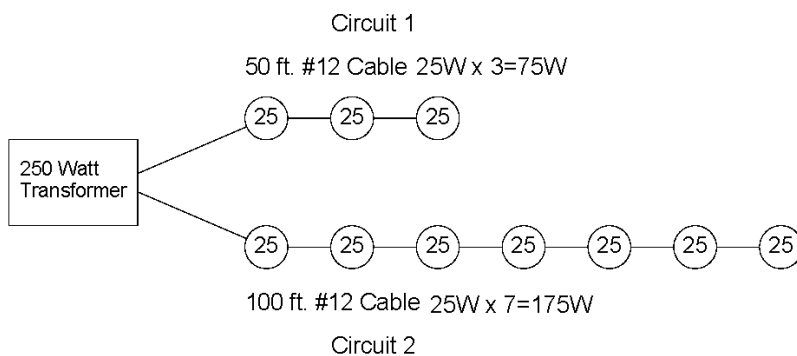
Technical

VOLTAGE DROP FORMULA

$$\frac{\text{Total Walts on Cable} \times \text{Length of run in Feet}}{\text{Cable Size Constant (From Chart Below)}} = \text{Voltage Drop}$$

Voltage Drop is created by internal resistance to the flow of electricity through electric cable. It is the difference between the voltage at the beginning (source) of a cable run and that at its end. If the Voltage Drop is great enough, there will be a noticeable decrease in brightness of lamps along the cable.

Maximum acceptable Voltage Drop is 1.3 to 1.5 Volts. If 60% or more of the fixtures are in the first half of the run, reduce the Voltage Drop figure by 16% or more of the fixtures are in the last half of the run, increase the Voltage Drop figure by 33%.



$$\text{Circuit 1: } \frac{75 \times 50}{7500} = .5V \text{ Voltage Drop}$$

$$\text{Circuit 2: } \frac{175 \times 100}{7500} = 2.34V \text{ Voltage Drop}$$

TOO MUCH!

Recalculate using #10 wire:

$$\frac{175 \times 100}{11920} = 1.47V \text{ Voltage Drop}$$

Effect of Voltage on Lamp Life & Light Output		
Voltage at Lamp	Lamp Life Expectancy	% of Rated Candlepower
13.2	2/3 rated life	350
12.6	3/4 rated life	180
12.0	As Rated	100
11.5	2 x rated life	80
11.0	3 x rated life	75
10.75*	4 x rated life	70
10.5	5 x rated life	65
10.0	9 x rated life	50

Cable Size Constants	
#18	1380
#16	2200
#14	3500
#12	7500
#10	11920
#08	18960
#06	30150

*Halogen lamps run at lower than 10.75 volts will have a significantly reduced lamp life.

-Ideal voltage of lamps is 10.5 to 12.0 volts, 10.75 to 12.0 volts for halogen lamps.

Technical

Metric Conversion

1 inch=2.540 centimeters

1 cm= 0.394 inches

39.37 inches= 1 meter

3.281 feet= 1 meter

Foot Candle= candle power/distance squared

Foot Candle= Amount of light falling on 1 square foot-one foot from a standard 3/4" candle

Foot Candle= 1 lumen per square foot

Foot Candle= 10.7639 Lux

1 Lux=0.0929 Foot Candles

Copper Wire Resistance

Gauge A.W.G.	Feet per OHM	Ohms Per 1000 Ft.
#18	153.6	8.21
#16	244.5	4.09
#14	387.6	2.58
#12	617.3	1.62
#10	980.4	1.02
#8	1560.0	0.6941

Stranded Copper Wire Specs

Gauge A.W.G.	Area in Circular mills	#Strands	Size of individual strand
#18	1620	16	.010cm (#30 AWG)
#16	2580	26	.010cm (#30 AWG)
#14	4110	41	.010cm (#30 AWG)
#12	6530	65	.010cm (#30 AWG)
#10	10400	104	.010cm (#30 AWG)
#8	16500	168	.010cm (#30 AWG)

Section 310-16 NEC Ampacities Of Cable Directly Buried

Gauge	AMPS
#18	10
#16	13
#14	15
#12	20
#10	25
#8	40

12V at Powercenter™; 100 ft. #12-2 with 50W at end.

Voltage Drop Using OHMS Law

Formula: current in AMPS x Resistance in OHMS= Voltage Drop.

Example: 50W / 12V = 4.16A (current in Amps)

1.62 per 1,000' /10 = .162 (Resistance in OHMS)

4.16A X .162 = .674 Volt Drop

12V- .674 volt drop= 11.32V at fixture

Using Nightscaping® Formula

100FT. (Length on Run) x 50W (total Watts on run) 7500 (cable size constant)= .666 volt drop.

12V- .666 volt drop= 11.33 V at fixture.

Nightscaping™ The Safe System