Voltage Drop

Example #5 - Temporary Job Site Light, Tripod, Corded (AC), Lumens 8000, Number of Lamp Heads 1

Technical Specs

Item	**Temporary Job Site Light**
Type - Job Site Lighting	**Tripod**
Power Source - Job Site Lighting	**Corded (AC)**
Lumens	**8000**
Number of Lamp Heads	**1**
Cord Length - Job Site Lighting	**5 ft.**
Max. Extension Height	**63"**
Lighting Technology	**Halogen**
Light Distribution - Job Site Lighting	**Flood**
IP Rating	**IP54**
Safety Rated	**Not Safety Rated**
Voltage	**120VAC**

Lamp Watts	**500**
Color	**Copper**
Item - Job Site Lighting	**Temporary Job Site Light**
Lamp Included	**Yes**
Rated Life	**2000 hr.**
NEC Cord Designation	**SJTW**
Gauge/Conductor	**18/3**
NEMA Plug Configuration	**5-15P**
Guard Type	**Metal**
Replacement Lamp	**500W 4-5/8" T3**
Features	**Weatherproof ON/OFF Switch, Telescopes From 40" to 67" With "Easy Grip" Locking Nuts**
Standards	**UL, cUL**

$VD_{Line} = 120V - 115V = 5\ V$ (maximum)

$I_T = \frac{P_T}{E_T} = \frac{500W}{120\ V} = 4.17\ A$

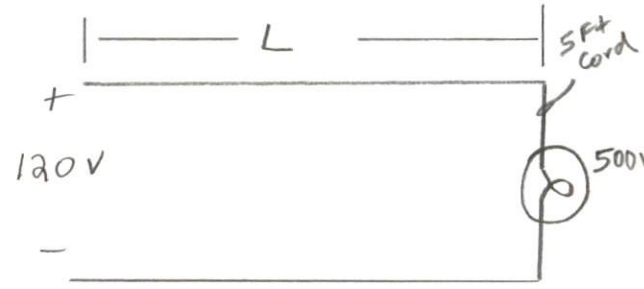
$R_{Line} = 2 \times \frac{ohm}{KFT} \times L$

$VD_{Line} = I_T \times R_{Line} = I_T \times \left(2 \times \frac{ohm}{KFT} \times L\right)$

$L = \frac{VD_{Line} \times 1000\ ft}{I_T \times 2 \times Ohm}$

$= \frac{5V \times 1000\ ft}{4.17\ A \times 2 \times ohm}$

Gauge/Conductor	Ohms/kFT	Length (L) ft
18/3	7.95	75
16/3	4.99	120
14/3	3.14	191
12/3	1.98	303



$VD_{cord} = 4.17\ A \times 2 \times \frac{7.95\Omega}{1000\ ft} \times 5\ ft$

$= 0.33\ V$

Example #6

A single-phase, 240-volt air-conditioner is being installed for a small commercial building. The nameplate reads: "Minimum Circuit Ampacity 40 Amperes." The circuit originates at the main panel located 125 ft from the air-conditioner unit.

1. Determine the maximum voltage drop of the line recommended by the NEC?
2. What is the minimum size THWN CU conductors required and where in the NEC do you find this?
3. Determine the voltage drop due to the conductors. Does it meet the code requirement? If not, what should be done to meet the code?

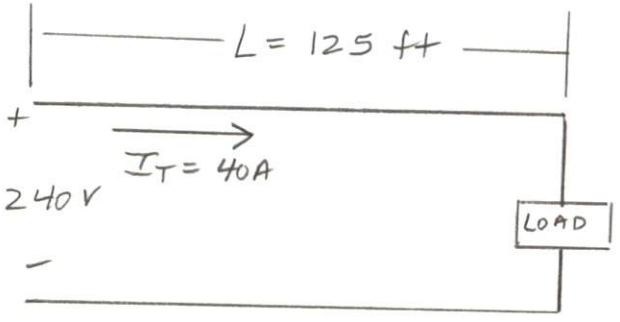
1. NEC recommends no more than 3%

$$VD_{Line} = 240\ V \times 0.03 = 7.2\ V \quad MAX$$

2. Table 310.15 (B) (16) [Article 310 310.60]

THWN 75°C #8 AWG CU (50A)

3.



Chapter 9, Table 8

stranded 8 AWG $0.778 \frac{ohm}{K\ FT}$

$$VD_{Line} = I_T \times R_{Line}$$

$$= 40A \times \left(2 \times 0.778 \frac{ohm}{K\ FT} \times 125\ ft\right)$$

$$= 7.78\ V$$

7.78 V > 7.2 V (Exceeds 3% Recommendation)

INcrease wire size to #6 $0.491 \frac{ohm}{K\ FT}$

$$VD_{Line} = 40A \times 2 \times 0.491 \frac{ohm}{1000\ FT} \times 125\ ft = 4.91\ V$$