

CMGT 235 – Electrical and Mechanical Systems

Homework #24 – Voltage Drop

Due: 11/15/2022

Points: 20

Name: Solution

Temporary Job Site Light, Floor Stand, Corded (AC), Lumens 4300, Number of Lamp Heads 2

A job site is powering two (2) of the temporary lights described below with a 120VAC portable diesel generator. If the lamp voltage can be no less than 117V, determine the length for an 18/3 CU (uncoated) extension cord. The lamps are wired in parallel. Include the 12 ft cord for each light in your calculation (see circuit diagram). Round answer to WHOLE number.

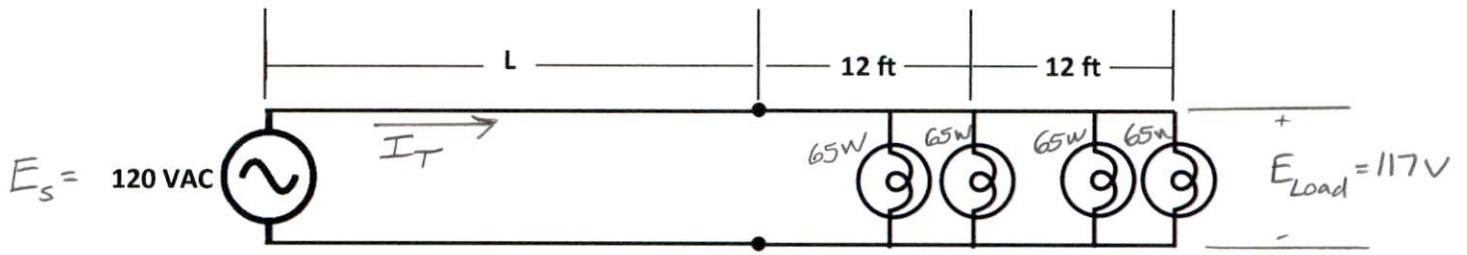
Technical Specs

Item	Temporary Job Site Light	Voltage	120VAC
Type - Job Site Lighting	Floor Stand	Lamp Watts	65
Power Source - Job Site Lighting	Corded (AC)	Color	Yellow
Lumens	4300	Item - Job Site Lighting	Temporary Job Site Light
Number of Lamp Heads	2	Lamp Included	Yes
Cord Length - Job Site Lighting	12 ft.	Rated Life	8000 hr.
Max. Extension Height	81"	Gauge/Conductor	18/3
Lighting Technology	Fluorescent	Guard Type	Wire
Light Distribution - Job Site Lighting	Flood	Replacement Lamp	2YKH9
Safety Rated	Not Safety Rated	Standards	UL, cUL



SHOW ALL WORK ON THE NEXT PAGE FOR FULL CREDIT

Solution.



$$VD = 120V - 117V = 3V$$

$$VD = \frac{2 \times L \times R \times I}{1000} \quad \text{and} \quad L = \frac{VD \times 1000}{2 \times R \times I}$$

$$P_T = 4 \times 65W = 260W$$

$$I_T = \frac{P_T}{E_T} = \frac{260W}{120V} = 2.17A$$

Extension Cord 18/3 } Chapter 9, Table 8  
Lamp Cords 18/3 } 18 stranded 7.95  $\Omega$ /kft

Because the extension cord wire gauge is the same as the lamp cord wire gauge:

$$\begin{aligned} L + 24\text{ ft} &= \frac{VD \times 1000}{2 \times R \times I} \\ &= \frac{3V \times 1000}{2 \times 7.95 \frac{\Omega}{kft} \times 2.17A} \\ &= 87\text{ ft} \end{aligned}$$

$$L = 87\text{ ft} - 24\text{ ft} = \underline{\underline{63\text{ ft}}}$$