

CMGT 235 – Electrical and Mechanical Systems

Homework #28 – Electrical Systems

Due: 12/1/2022

Points: 20 [Extra Credit]

Name: Solution

SHOW ALL CALCULATIONS FOR FULL CREDIT

1. A 7,500 W electric garage heater is running on 240 VAC single phase.

A. Calculate the continuous full load amperage (FLA).

$$I = \frac{P}{E} = \frac{7500 \text{ W}}{240 \text{ V}} = 31.25 \text{ A}$$

B. Determine the Over Current Protection (OCP) circuit breaker required.

$$I = 31.25 \text{ A} \times 1.25 = 39.0625 \text{ A}$$

OCP use 40 A circuit Breaker

C. Determine the size copper THHN 75° C conductor required.

Table 310.15 (B)(16)

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D. If the maximum voltage drop for the unit is limited to 3%, determine the longest length the conductors can be.

$$VD_{\text{MAX}} = 3\% \times 240 \text{ V} = 7.2 \text{ V}$$

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solid 0.764  $\Omega$ /kft

Stranded 0.778  $\Omega$ /kft

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

$$= \frac{7.2 \text{ V} \times 1000}{2 \times \frac{0.764 \text{ } \Omega}{\text{kft}} \times 40 \text{ A}}$$

$$= 117.8 \text{ ft}$$