

PART 3

Volt drop on one of 3 Ph machines:

$$P = 3.5 \text{ kW}$$

$$PF = 0.8$$

$$L = 38 \text{ m}$$

$$\text{Cable} = 2.5 \text{ mm}^2, \text{ XLPE SWA, } 90^\circ\text{C}$$

$$\text{Sub main cable } V_{\text{drop}} = 4.12 \text{ V}$$

$$I_b = \frac{P}{\sqrt{3} \times V_L \times PF} = \frac{3500 \text{ W}}{\sqrt{3} \times 400 \text{ V} \times 0.8} = 6.31 \text{ A}$$

$$\text{Circuit } V_{\text{drop}} = \left(\frac{\text{table 4E4B}}{1000} \right) \times L \times I_b = \frac{16 \times 38 \times 6.31}{1000} = 3.84 \text{ V}$$

$$\text{Total } V_{\text{drop}} = \text{Submain } V_d + \text{CCT } V_d = 4.12 \text{ V} + 3.84 \text{ V} = 7.96 \text{ V} < 20 \text{ V}$$

Max and actual Volt drop of one convector heater:

$$\text{Max } V_d = 11.5 \text{ V} \quad (\text{Table 4Ab. Apr } 4)$$

$$\begin{aligned} \text{Act. } V_d &= \left(\frac{(\text{table 4D1A}) \times L \times I_b}{1000} \right) + \text{Submain } V_d = \\ &= \left(\frac{18 \times 28 \times 13.04}{1000} \right) + 4.12 \text{ V} = 10.69 \text{ V} < 11.5 \text{ V} \end{aligned}$$

Max and actual Z_s for cooker:

Max Z_s for cooker:

$$I_b = \frac{P}{V} = \frac{6000 \text{ W}}{230 \text{ V}} = 26.09 \text{ A}$$

$$I_n = 32 \text{ A, Type B, MCB. Max } Z_s = 1.44 \Omega \quad (\text{table 41.3})$$

$$I_z = \frac{I_n}{C_a} = \frac{32 \text{ A}}{1.03} = 31.07$$

$$I_z = 4 \text{ mm}^2 \quad (\text{max capacity } 32 \text{ A}) \quad (\text{table 4D1A})$$

$$\text{Act. } Z_s = Z_e + Z(\text{submain}) + (R_1 + R_2)$$

$$(R_1 + R_2) = \left(\frac{\text{table 11.056}}{1000} \right) \times L \times \left(\frac{\text{table 13.056}}{1000} \right) = \frac{9.22 \times 15 \times 1.2}{1000} = 0.166 \Omega$$

$$Z_s = 0.03 + 0.18 + 0.166 = 0.376 \Omega < 1.44 \Omega \quad (\text{complies})$$