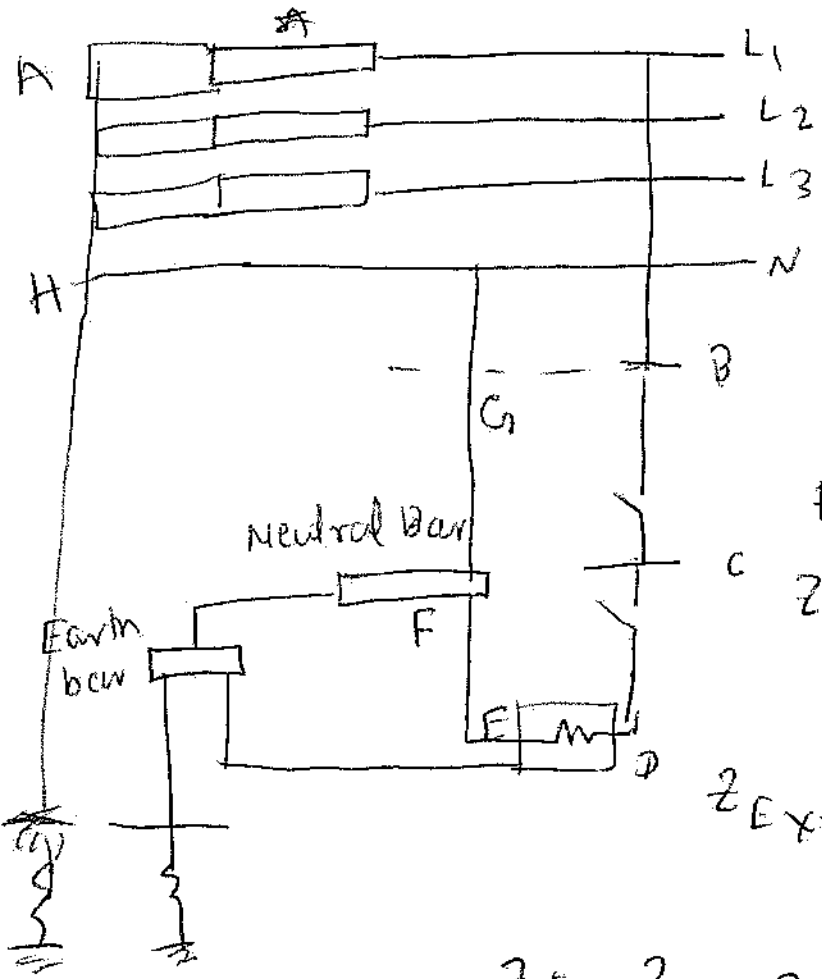
(2)



Point of supply

Fault loop Impedance

$Z_s = Z_{AB} + Z_{BC} + Z_{CD} + Z_{EF} + Z_{GH} + Z_{HA}$

$Z_{Ext} = Z_{AB} + Z_{BC} + Z_{CD} + Z_{FG} + Z_{GH} + Z_{HA}$

$Z_s = Z_{INT} + Z_{EXT}$

$Z_{fault\ loop} = 0.25\Omega + 3\Omega + 6\Omega + 3\Omega + 0.25\Omega$

$= 9.5\Omega$

$I_{fault} = \frac{230}{9.5} = 35.3A$

If fault resistance at appliance is 3Ω

$I_{fault} = \frac{230}{9.5} = 24.2A$

outlet is 1.2Ω. Determine whether this value of internal fault loop impedance based on 230V satisfies the requirements of AS/NZS 3000:

Table 8.1 page 10

16A, Type C, 230V $Z_{fault\ loop}$ = 1.92Ω

Now 1.2Ω is lower than 1.92Ω

It satisfies AS 3000.

TQ 3.15, TQ 3.16 Do it yourself

TQ 3.17 HRC fuse

A final sub circuit supplies a load consisting of 15A socket outlet and is protected by a 25A HRC Fuse. Determine the maximum internal fault loop impedance of the final sub circuit based on 230V when supply is unavailable.

Table 8.1 page 10

25A HRC fuse → 1.64Ω

TQ 3.18 Determine the maximum route length of a circuit in accordance with AS/NZS 3000:2007 for a single phase circuit that has an active conductor size of 6mm² and a 2.5mm² earthing conductor if the circuit is protected by a 40A circuit breaker with a type D curve

T@3.29 Given a 11KV/ 400V (Delta / star) 600 KVA transformer has an impedance of 4%, determine the (a) rated current (b) fault current at the transformer secondary terminals (c) fault level at transformer secondary terminals (d) transformer impedence in ohms

Rated current = $\frac{KVA}{\sqrt{3} \times E} = \frac{600 \times 10^3}{1.7321 \times 11 \times 10^3} = 31.49A$

Secondary current = $\frac{KVA}{\sqrt{3} \times E} = \frac{600 \times 10^3}{1.7321 \times 400} = 866A$

Fault current - $I_{SH} = \frac{I_{FL}}{\%Z} \times 100 = \frac{866}{4} \times 100 = 21650$ A

Fault level = $MVA_{SH} = \frac{MVA_{FL}}{\%Z} \times 100$

$= \frac{600}{4} \times 100 = 15$ MVA

$\%Z = \frac{I_{FL} \times Z_{ph}}{E_{ph}} \times 100$ $\quad \Delta = 11KV = E_{ph}$

$4 = \frac{31.49 \times Z_{ph}}{11 \times 10^3} \times 100 \Rightarrow Z_{ph} = \frac{4 \times 11000}{31.44 \times 100} = 13.99\ \Omega$

T@3.30 A 11KV, (Δ/Y), 500KVA transformer has a nominated fault level of 10MVA, determine
- Prospective fault current at the transformer
- transformer impedance in ohms.

$I_{SH} = \frac{MVA_{SH}}{\sqrt{3}\ E} = \frac{10 \times 10^6}{1.7321 \times 11 \times 10^3} = 524.2A$

$I_{FL} = \frac{500 \times 10^3}{\sqrt{3} \times 11 \times 10^3} = 26.24A$ primary

$I_{SH} = \frac{I_{FL}}{\%Z_{ph}} \times 100 \rightarrow 524.8 = \frac{15.15}{\%Z_{ph}} \times 100$

$I_{ph} = \frac{26.24}{\sqrt{3}} = 15.15A$

To 3.33

A 3 phase 400/230V service supplies the main switchboard to a block of factory units. The supply authority advises that the fault level at the consumer's terminals is 12kA. The consumer's mains consist of 50mm² active conductors and a 35mm² neutral conductor having a length of 30 meters. Determine the theoretical fault current at the main switchboard, use the table from fig 3.3.4 to determine cable impedance.

Active 50mm² Neutral 35mm², 30m

(0.0114 Ω)

To 3.42

2.2kW quick recovery water heater is to be installed in the tea room of an existing factory.
The nearest distribution board has HRC fuses fitted with spare fuse holders for additional circuits. The TPS cable is to be run through the roof space of the tea room which has terminal insulation installed.

(a) Determine maximum demand current
(b) select a fuse to protect the circuit
(c) current carrying capacity of cable, assume cable is partially surrounded
(d) Do the values of current comply with $I_B < I_n < I_z$?
(e) Does the arrangement comply with $I_2 < 1.45 \times I_z$?
(f) What is required to ensure the circuit will comply?
(g) Assuming 1.5mm² cable is used, will the arrangement provide