1. MCB Current Rating Calculations

All calculations follow BNBC 2020 (Part 8, Chapter 1) with:

- **Voltage: 220V**
- **Power Factor (PF): 0.8**
- **Continuous Loads: 125% safety margin.**
- **Non-Continuous Loads: 100% of rated power.**

Switchboard (SB) Calculations

SB1 (Lighting Circuit)

- **Load: 10W LED (Continuous)**
- **Power: 10W×125%=12.5W10*W*×125%=12.5*W***
- **Current:**

I=12.5W220V×0.8=0.071A*I*=220*V*×0.812.5*W*=0.071*A*

- **MCB Selected: 6A (Standard for lighting).**

SB2 (Exhaust Fan + Light)

- **Loads:**
  - **70W Light (Continuous)**
    → 70W×125%=87.5W70*W*×125%=87.5*W*
  - **50W Exhaust Fan (Non-Continuous)**
    → 50W×100%=50W50*W*×100%=50*W*
- **Total Power: 87.5W+50W=137.5W87.5*W*+50*W*=137.5*W***
- **Current:**

$I = \frac{137.5W}{220V \times 0.8} = 0.781A$$I = \frac{137.5W}{220V \times 0.8} = 0.781A$

- **MCB Selected: 6A.**

SB5 (Multiple Loads)

- **Loads:**
  - **20W Fluorescent Light (Continuous)**
    → $20W \times 125\% = 25W$$20W \times 125\% = 25W$
  - **70W Fan (Continuous)**
    → $70W \times 125\% = 87.5W$$70W \times 125\% = 87.5W$
  - **2x 10W LEDs (Non-Continuous)**
    → $20W \times 100\% = 20W$$20W \times 100\% = 20W$
- **Total Power: $25W + 87.5W + 20W = 132.5W$$25W + 87.5W + 20W = 132.5W$**
- **Current:**

$I = \frac{132.5W}{220V \times 0.8} = 0.753A$$I = \frac{132.5W}{220V \times 0.8} = 0.753A$

- **MCB Selected: 6A.**

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2. Total Current & Main MCB Sizing

- **Sum of All SB Currents:**

$0.071A(SB1) + 0.781A(SB2) + 0.057A(SB3) + 0.057A(SB4) + 0.753A(SB5) + 0.597A(SB7) = 2.316A$$0.071A(SB1) + 0.781A(SB2) + 0.057A(SB3) + 0.057A(SB4) + 0.753A(SB5) + 0.597A(SB7) = 2.316A$

- **High-Power Appliances:**
  - **AC (15A Socket): 9.75A → 16A MCB**
  - **Oven (10A Socket): 10.87A → 16A MCB**

- Fridge (5A Socket): 3A → 16A MCB

- **Total Current: 6A(Lighting)+16A+16A+16A=54A6*A*(*Lighting*)+16*A*+16*A*+16*A*=54*A***
- **Main MCB Selected: 63A (Nearest standard rating).**

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3. Wire Sizing & Distribution Board

- **Lighting Circuits: 2 × 1.5mm² (Copper)**
- **Power Sockets: 2 × 2.5mm² (Copper)**
- **High-Power Appliances: 2 × 4mm² (Copper)**
- **Earth Wire: 16SWG (for 1.5mm²), 14SWG (for 4mm²).**

Distribution Board Layout:

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DB (63A Main MCB)

├── 6A MCB (Lighting) → 2 × 1.5mm²

├── 16A MCB (AC) → 2 × 4mm²

├── 16A MCB (Oven) → 2 × 4mm²

└── 16A MCB (Fridge) → 2 × 4mm²

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4. References

1. **BNBC 2020, Part 8, Chapter 1.**
2. **Power Consumption Data: DaftLogic.**