

## Topic Skills Practice Cover Sheet

<b>Unit Name:</b>	NAT10809004 – Select protection devices and systems for low voltage circuits and apparatus
<b>Topic Title:</b>	Protection against overload and short circuit current

<b>Skill Practice Number:</b>	5.2
<b>Skill Practice Name:</b>	Overcurrent Protection Arrangements

<b>Student Name:</b>	
<b>Student ID:</b>	
<b>College/Campus:</b>	
<b>Group:</b>	

Results	
<b>Planning:</b>	
<b>Carryout:</b>	
<b>Completion:</b>	
<b>Overall Results:</b>	
<b>Comments:</b>	

# Topic Skills Practice 5.2

**NAT10809004 – Select protection devices and systems for low voltage circuits and apparatus**

**KE-10809004 LV protection devices and systems principles**

**Topic: 5. Protection against overload and short circuit current**

**Skills Practice 5.2: Overcurrent Protection Arrangements**

**Task:**

To design a protection arrangement for a single phase electrical installation.

**Objectives:**

At the completion of this skills practice, you should be able to:

- Select circuit overcurrent protective devices to ensure adequate protection of circuit conductors.
- Select circuit overcurrent protective devices to ensure coordination between protective device current ratings.
- Select fault current limiting devices for discrimination and back-up protection.
- Document the selection of protective devices.

## 1. Planning the Skills Practice

### 1.1 Identify Overcurrent Protection Requirements

1.1.1 Research AS/NZS 3000:2018 and the following reference material to determine the requirements and arrangements for the provision of overcurrent protection by automatic disconnection of the supply (ADS).

The following reference material will include some useful information:

- Energy Space content page 5.2
- Pethebridge, K. and Neeson, I., Electrical Wiring Practice. McGraw-Hill, Seventh Edition, Volume 2 (Chapters 1.2, 1.3 and 1.5)
- Hampson, J., Electrotechnology Practice, Pearson Education, Third Edition, 2014 (Sections 10.1-3)

1.1.2 Once you feel you have sufficient knowledge of the subject matter, obtain the following materials to assist you with carrying out this skills practice:

- AS/NZS 3000:2018 Wiring Rules
- Pens/pencils

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### 2. Carrying Out the Skills Practice

#### 2.1 Installation Specifications

2.1.1 The 230 V, 50 Hz single phase electrical installation is required to supply a domestic four bedroom house. The installation consists of 16 mm<sup>2</sup> XLPE consumer's mains supplying a single tariff main switchboard.

The following table shows the circuit arrangements at the main switchboard, and has spaces for you to fill in with your selection of suitable protective devices.

Note: RCBOs are to be used where RCD protection is required.

Main Switchboard							
Circuit			Conductor		Protective Device		
No.	Connected Load	Maximum Demand	Size	Current Carrying Capacity	Type	Nominal Current Rating	Breaking Capacity
1	Distribution Board 1	38 A	6 mm <sup>2</sup>	41 A			
2	10 A socket outlets	18 A	2.5 mm <sup>2</sup>	23 A			
3	Downlights	12 A	1.5 mm <sup>2</sup>	18 A			
4	General lighting and exhaust fan	3 A	1.5 mm <sup>2</sup>	18 A			
5	Stove	25 A	4 mm <sup>2</sup>	34 A			
6	Instantaneous water heater	30 A	4 mm <sup>2</sup>	34 A			

2.1.2 The following table shows the circuit arrangements at the workshop distribution board, and has spaces for you to fill in with your selection of suitable protective devices.

Note: RCBOs are to be used where RCD protection is required.

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Distribution Board 1							
Circuit			Conductor		Protective Device		
No.	Connected Load	Maximum Demand	Size	Current Carrying Capacity	Type	Nominal Current Rating	Breaking Capacity
1	10 A socket outlets	12 A	2.5 mm <sup>2</sup>	23 A			
2	15 A socket outlet	15 A	2.5 mm <sup>2</sup>	23 A			
3	20 A socket outlet	20 A	2.5 mm <sup>2</sup>	23 A			
4	Fluorescent lighting	2 A	1.5 mm <sup>2</sup>	18 A			

2.1.3 The following table contains information regarding the consumer's mains, and has spaces for you to fill in with your selection of suitable protective and control devices.

Consumers Mains							
Installation	Conductor		Main Switch		Fault Current Limiter		
Maximum Demand	Size	Current Carrying Capacity	Nominal Current Rating	Breaking Capacity	Type	Nominal Current Rating	Breaking Capacity
70 A	16 mm <sup>2</sup>	101 A					

### 2.2 Select Protection Devices

2.2.1 Select protective devices to protect each circuit, ensuring coordination and compliance with the following requirements.

For circuit breakers:

$$I_B \leq I_N \leq I_Z$$

and

$$I_2 \leq 1.45 \times I_Z$$

For HRC fuses:

$$I_B \leq I_N \leq 0.9 I_Z$$




and

$$I_2 \leq 1.45 \times I_Z$$

2.2.2 Document your selections in the spaces provided in the 'Main Switchboard' and 'Distribution Board 1' switchboard schedules from Section 1.1.

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2.2.3 Select a fault current limiting device to be installed at the main switchboard, and will provide backup protection for the installation.

	 <i>Feedback</i>	Have your teacher/trainer check your work	Teacher/Trainer Initials and Date	

### 3. Completing the Skills Practice

#### 3.1 Skills Practice Review Questions

3.1.1 When you have successfully completed the activities in Section 2, answer the following review questions.

1. Did you use any electrical supplier's catalogues to complete this skills practice, and if so, list them here:

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2. Why is it important for a fault current protective device to have a sufficient breaking capacity?

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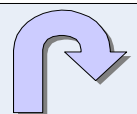
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	 <i>Feedback</i>	Have your teacher/trainer check your answers are correct	Teacher/Trainer Initials and Date	