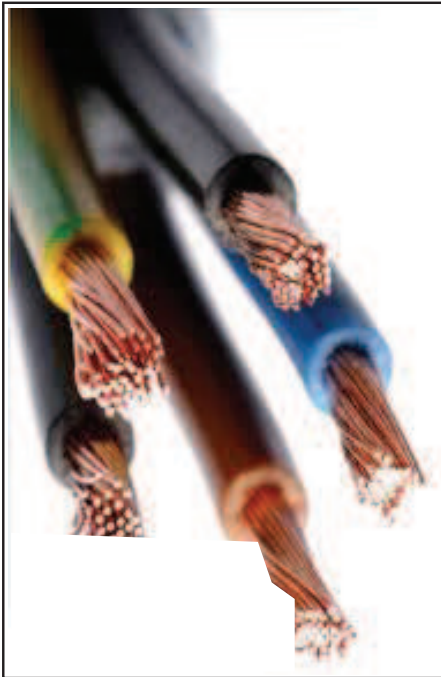


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# ELECTRICAL WIRING STANDARDS

## - AS 3000 2007



### YOU WILL LEARN HOW TO:

- Identify the various sections and requirements of the standard
- Understand these requirements and apply them in their day-to-day functioning
- Appreciate the importance of fulfilling the requirements for safe use of electrical equipment and systems
- Have a clear knowledge of earthing and its importance in safety
- Make simple calculations to check the adequacy of conductors and protective earthing components to ensure safe operation
- List the periodic checks and verification measures to be carried out in an electrical installation as mandated by the standard

### WHO SHOULD ATTEND:

- |   |   |
|---|---|
| • Instrumentation and Control Engineers | • Electricians                                  |
| • Consulting Engineers                  | • Electrical Inspectors                         |
| • Electrical Engineers                  | • Power System Protection and Control Engineers |
| • Project Engineers                     | • Building Service Designers                    |
| • Maintenance Engineers                 | • Data Systems Planners and Managers            |
| • Electrical Contractors                | • Electrical and Instrumentation Technicians    |
| • Safety Professionals                  |   |
| • Consulting Engineers                  |   |

## The Workshop

This workshop aims to familiarise the participants with the requirements laid down in the standard AS/NZS 3000, commonly known as Australia-New Zealand Wiring Rules. For those installations covered in the scope of this standard, its provisions are mandatory and must be followed. Any engineer involved in planning and design of electrical systems, their installation or maintenance must have a clear idea about the various requirements contained in the standard.

The primary purpose of this standard, like many of its various other equivalent national standards, is to ensure the safety of personnel against the dangers arising from the use and handling of electrical equipment and appliances. The introductory modules of this workshop outline the basic principles that should be understood for a better appreciation of the standard. These include modules, which illustrate the calculation for the power demand of a system and the computation of earth fault current as discussed in the appendices of the standard, which are informative in nature but yet are very important in making an electrical system safe for operation. The actual provisions of the standard are then discussed in detail in the subsequent modules.

### Pre-requisites

A working knowledge of basic electrical engineering principles is required. Experience in planning, installation and maintenance of electrical equipment and systems will enable the workshop to be placed in context.

## The Program

### INTRODUCTION AND OVERVIEW

- Evolution of electrical distribution systems
- Electrical insulation
- Current limits of conductors based on insulation
- Current ratings based on installation methods
- Earthing and its importance in safety
- Methods adopted for system Earthing
- Earth fault sensing methods
- Other hazards
- AS/NZS 3000 preface and contents

### AS/NZS 3000 STANDARD-SCOPE AND DEFINITIONS

- Application areas
- Learning a few terms
- Alterations, additions and repairs alternative arrangements
- Protection for safety
- Design of an electrical installation
- Selection and installation of electrical equipment
- Inspection and testing

### SELECTION AND INSTALLATION OF SWITCHGEAR AND CONTROLGEAR

- Arrangement and control of electrical installation
- Devices for isolation and switching
- Fault protection
- Devices for protection against overcurrent and short circuit
- Coordination and discrimination
- Protection against earth leakage current, overvoltage and undervoltage
- Switchboards
- Circuit arrangements, protection coordination, limits of LV feeder lengths for proper earth fault detection (as per AS/NZS 3000)
- Calculating the demand of electrical systems for proper conductor sizing (as per AS/NZS 3000)
- The degree of protection of an item of enclosed equipment (as per AS/NZS 3000)

#### Practical Work - Calculations

### SELECTION AND INSTALLATION OF WIRING SYSTEMS

- Types of wiring systems
- External influences
- Current-carrying capacity
- Sizing of conductors
- Voltage drop considerations in sizing
- Electrical connections
- Identification of wires and cables
- Installation
- Enclosure of cables
- Underground wiring systems
- Aerial wiring systems
- Cables supported by a catenary
- Emergency systems
- Busbar trunking systems and rising mains
- Earth sheath return system
- Sinking depth and sizes of support structures for private aerial lines. (as per appendix D of AS/NZS 3000)
- Application of the WS classification of wiring systems in accordance with AS/NZS 3013 (as per appendix H of AS/NZS 3000).

#### Practical Work - Calculations

### SELECTION AND INSTALLATION OF APPLIANCES AND ACCESSORIES

- Protection against thermal effects
- Socket outlets
- Lighting equipment and accessories
- Cooking appliances
- Heaters
- Motors
- Capacitors
- Transformers
- Batteries

### REQUIREMENTS FOR EARTHING IN ELECTRICAL INSTALLATIONS

- Earthing arrangements
- Multiple Earthed Neutral (MEN) system
- Earthing conductors
- Earthing system components
- Equipment Earthing and equipotential bonding
- Earth fault loop impedance
- Earthing requirements for other (non-electrical) systems

### REQUIREMENTS FOR SPECIAL ELECTRICAL INSTALLATIONS/ LOCATIONS

- Locations containing baths, showers or other fixed water containers
- Swimming pools, paddling pools and spa pools or tubs
- Locations containing sauna heaters
- Refrigeration rooms
- Locations where general hosing down operations are carried out
- Fountains and water features
- Extra-low voltage electrical installations
- High voltage electrical installations
- Hazardous areas
- Emergency systems
- Requirements for electrical installations operating at high voltage

### TESTING AND VERIFICATION REQUIREMENTS OF THE STANDARD

- Visual inspection
- Testing
- Common inspection and test methods for low voltage, Multiple Earthed Neutral (MEN) electrical installation as per AS/NZS 3017
- Periodic verification of existing electrical installations of low voltage AC supply system as per AS/NZS 3019

### SUMMARY, OPEN FORUM AND CLOSING