

6007 / Electrical safe working - ZIP 6008 / WH2

5.2 Electrical Practices for Construction Work (2007) a WorkCover Code of Practice.



1-312

ELECTRICAL

PRACTICES FOR CONSTRUCTION WORK



CODE OF PRACTICE 2007

WorkCover. Watching out for you.



It must be noted that under the provisions of the NSW Occupational Health & Safety Act (2000) if an approved Code of Practice exists then the requirements laid out in that Code must be followed and can overrule AS/NZS 3760.

The Code states *“this Code of Practice should be followed, unless there is an **alternative course of action which achieves the same or better standard of health and safety in the workplace**”*

(WorkCover NSW Code of Practice 2007, p.5)

6.0 Persons Qualified to Test Equipment

The Code of Practice requires a licensed electrician to carry out testing. However WorkCover does allow other competent persons to do testing.

When testing, authorised persons must comply with AS/NZS 3760 and/or the WorkCover Code of Practice “Electrical Practices for Construction Work”.

7.0 Testing Isolating Transformers and Residual Current Devices

There is currently no portable appliance tester made to test Isolation transformers or Residual Current Devices (RCD). Testing of an Isolation Transformer must be left to a licensed electrician using an Insulation Resistance Tester.

Testing of RCD devices requires a dedicated tester.



An RCD tester



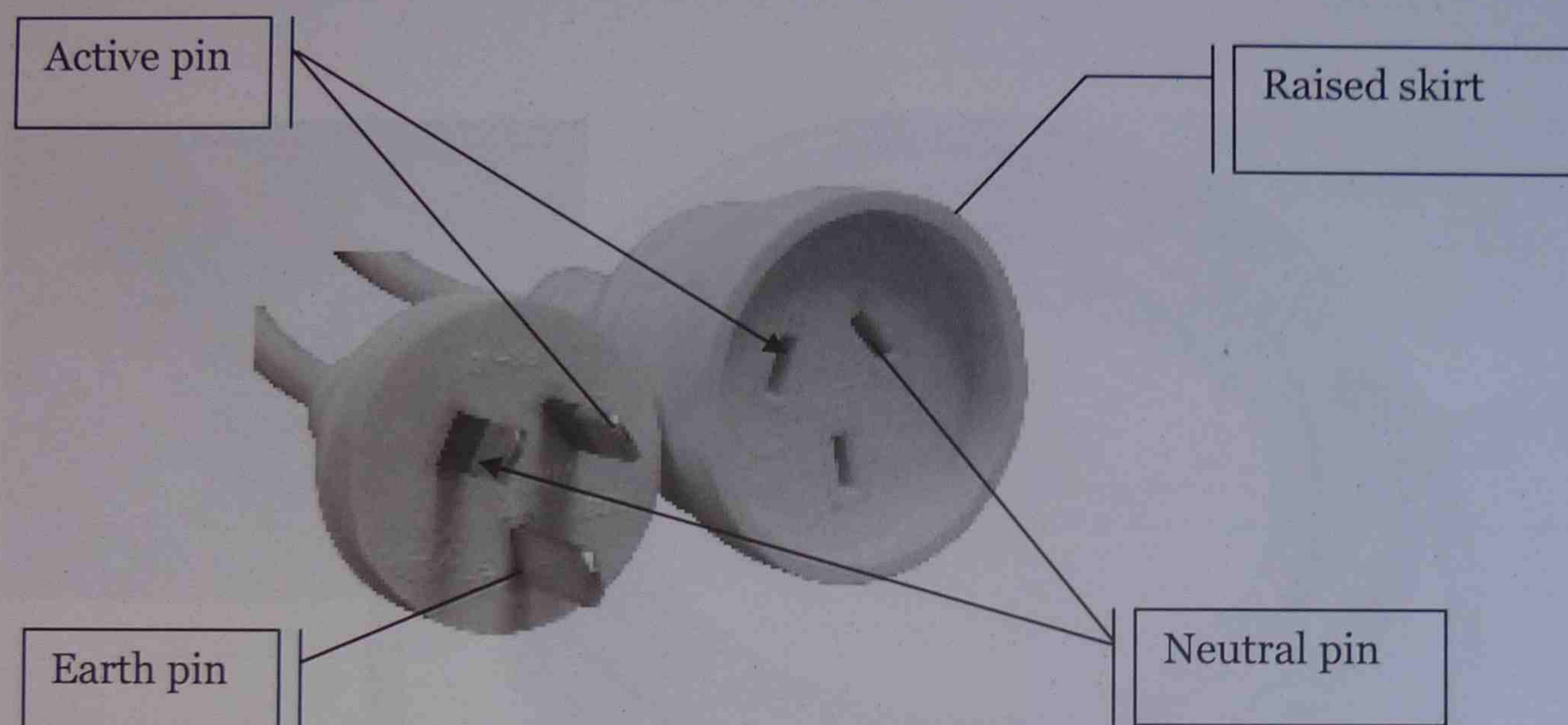
An Isolation Transformer

8.0 3 Pin Plugs and Sockets

8.1 Connections

All 3 pin plugs and cord sockets installed on portable equipment must have their pin connections as shown in the figure below.

Sockets must have a raised skirt around the front edge and plugs a required to have a partially insulated pin. Both must be either moulded or in clear plastic insulation.



8.2 Wire Colours

The International Colour Code for single phase flexible leads is now in use throughout most countries and is as follows:

- Earthing conductor - green with a yellow stripe
- Active conductor - brown
- Neutral conductor - light blue

The SAA wiring rules AS/NZS 3000:2007 give details of the colour code of wiring systems in Section 3, Rule 3.8.3.3 (page 134).

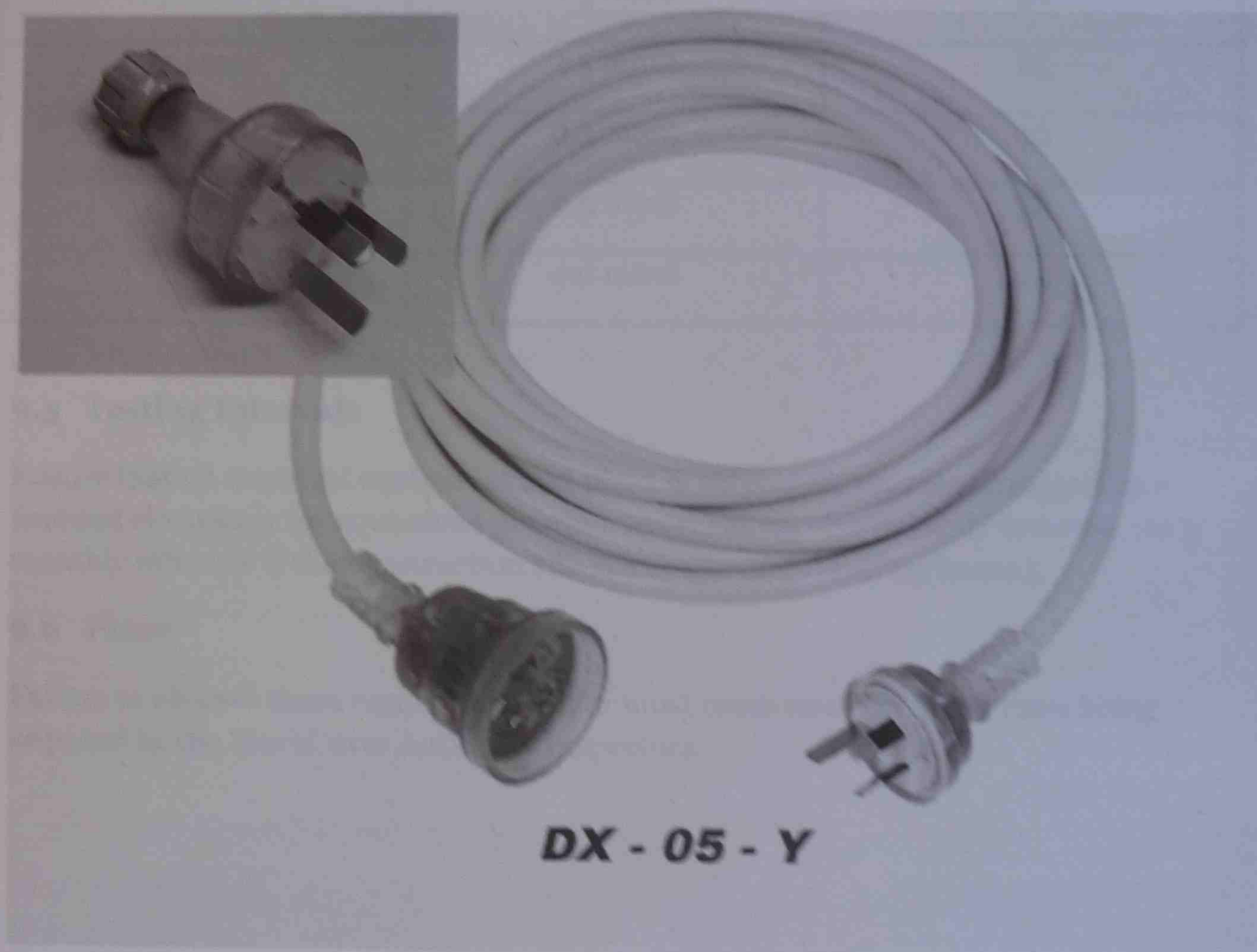
9.0 Construction Site Electrical Equipment

9.1 Plugs

All 3 pin plugs and cord extension sockets used on electrical equipment and extension leads are to be of the non re-wireable (moulded) type or be transparent (see through). Conductive pins on a socket plug must have a length of insulation along part of its length.

9.2 Sockets

The cord extension socket must be the type which has a protruding shield around its end. The shield is designed to prevent thin conductive objects from contacting the live pins of any plug inserted into the cord extension socket.



9.3 Extension Leads

Extension leads must be of the heavy duty sheathed type and comply with AS/NZS 3199:2007 "Approval and test specification – Cord extension sets".

9.4 Lead Lengths

Any extension lead which is part of electrical equipment must not be more than 5 metres long. Maximum lengths are shown in the table below.

Maximum Lengths of Flexible Cords		
Extension Lead Current Rating	Conductor Cross Sectional Area	Maximum Length metres
10 amps	1.0 mm ²	25
	1.5 mm ²	32
15 amps	1.5 mm ²	25
	2.5 mm ²	40
20 amps	2.5 mm ²	32
	4.0 mm ²	40

9.5 Testing Intervals

Ensure that all electrical equipment and plant is inspected, tested and tagged by a licensed electrician (or equivalent person / tester) at regular monthly intervals (or 3 monthly intervals if the construction site is a single unit dwelling house).

9.6 Fines

Failure to observe these regulations can, in most cases result in heavy fines being imposed by the WorkCover Authority Inspectors.

10.0 Testing Procedures

Tests that must be carried out include:

- Visual checks
- Earth resistance test (not applicable to double insulated appliances)
- Insulation resistance test
- Test for transposed active and neutral conductors

10.1 Visual checking

Check all equipment to see that there is:

- Obvious external damage
- Damage to any accessories, connections, plugs, outlets or indicating lamps etc.
- Component defects in any accessories, connectors, plugs, outlet sockets or indicating lamps etc.
- Exposure of (live) inner conductors of leads or cords
- Damage in the form of nicks, cuts, abrasions, or other damage in the outer sheath of cords or leads
- "tape bandages" on a lead or cord
- Insecure cord anchors
- Portable outlet device not labelled to show maximum power (load) capability
- Control knobs not secured and aligned correctly
- Ventilation inlets/outlets obstructed
- Mechanical safety features and devices not in good working order
- Replaceable protection devices of incorrect rating and/or type.

11.0 Class I (Protectively Earthed) Equipment

Examples of this equipment that you will find would be **soldering irons, radiators, fans, computers, 230volt electric motors, portable flood lights, extension leads** etc. Any equipment that is not doubly insulated is Class I equipment. It is referred to as "single insulated" equipment.

11.1 Visual Checks

Carefully check the appliance visually for any defects as described on the previous page.

11.2 Earth Resistance Check

The safety of this class of equipment relies on the fact that the earthing conductor is connected from the source (the pin on the 3 pin plug) to the exposed metal parts of the equipment. The earth must have a very low resistance. A test to ensure low earth resistance must be part of the testing procedure.

This test is known as the earth continuity test. AS/NZS 3760 allows a maximum resistance of 0.5Ω (half an Ohm).



11.3 Insulation Resistance Test

The second test determines whether the interior insulation is correctly insulating the live conductors from the earthed frame. The tester must be capable of applying a voltage of at least 500volts direct current (500 V d.c.) between live conductors and any exposed metal. The testing device should indicate if the equipment passes or fails the test. This test is known as the **insulation resistance test**.

The minimum insulation resistance is one million Ohms ($1 M\Omega$).

Some protectively earthed heating appliances have a mineral insulated metal sheathed heating element. AS/NZS 3760 requires the insulation resistance of these appliances to be not less than $0.01 M\Omega$ ($10,000 \Omega$). This is because of a small bleed resistor of 10,000 ohms being connected to earth on hot water systems. However the WorkCover Code of Practice "*Electrical practices for Construction Work*" does not mention mineral insulated heating elements and simply requires Class I equipment to have a minimum insulation resistance of $1 M\Omega$.



The Minimum Value of Resistance

The Multiple Earthed Neutral system (MEN)

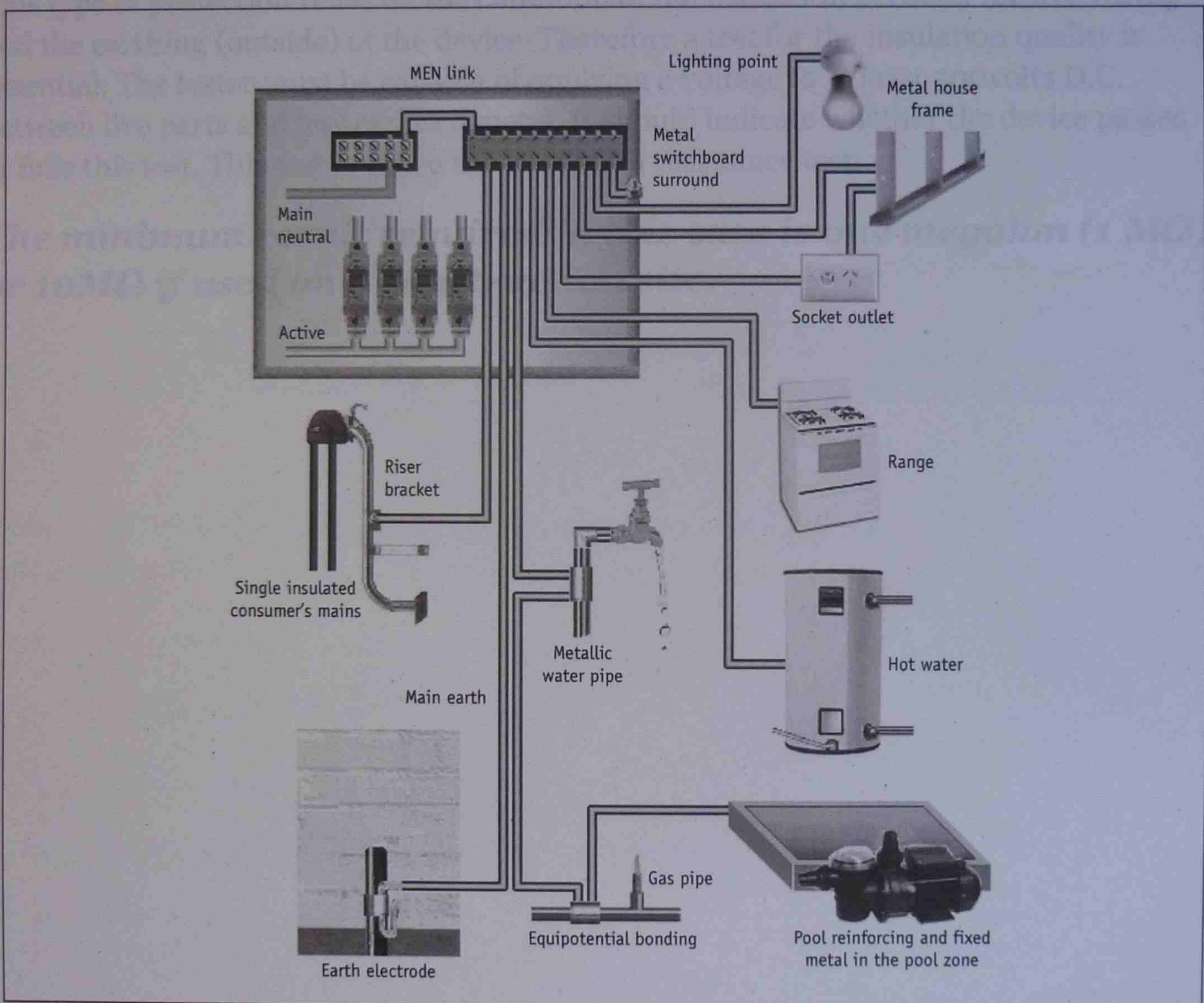


Figure 4.4 Residential MEN earthing system

12.0 Class II Double Insulated Equipment

Examples of Class II doubly insulated equipment include: **portable drills; angle grinders; circular saws etc.**

12.1 Visual Checks

Carefully check the appliance for any defects as described in previous pages. The device and the lead will not contain an earth wire as this would not be needed.

12.2 Insulation Resistance Test

This type of protection relies on the condition of the insulation between the live wiring and the earthing (outside) of the device. Therefore a test for the insulation quality is essential. The tester must be capable of applying a voltage to at least 500volts D.C. between live parts and any exposed metal. It should indicate whether the device passes or fails this test. This test is called the insulation resistance test.

The minimum result required in this case is one megohm ($1\text{ M}\Omega$) or $10\text{M}\Omega$ if used on a construction site.

Please refer to the JAGG CHPTX operations manual for instructions on how to carry out the following tests:

- Earth continuity
- Insulation resistance
- Leakage current
- Temperature limits and any other relevant
- Earth lead continuity

13.0 Using the TRIO SAFETCHECK Pro Logger II Tester



Please refer to the SAFETCHECK operations manual for instructions on how to carry out the following tests:

- Earth continuity
- Insulation resistance
- Extension leads
- Transposed active and neutral conductors
- Earth leakage test

14.0 What to do after Testing is Completed

14.1 Non-compliant equipment

If equipment is found to not comply with testing standards AS/NZS 3760 it is to be:

- Withdrawn from service immediately and suitably labelled with a warning against further use

And

- Sent to be repaired by an authorised service person or agent

Or

- Disposed of in such a way as to ensure it is not accidentally re-used.

14.2 Compliant Equipment

Equipment found to comply can now be used as long as it carries a current appropriately coloured tag.

14.3 Record Keeping

According to AS/NZS 3760:2003 Clause 2.5.1 and AS/NZS 3012:2003 Clause 3.9 the following items should be kept:

- A register of all equipment
- A record of formal inspections and tests
- A repair register
- A record of all faulty equipment showing details of services or corrective actions

A record of inspection and test results for electrical equipment must be kept in a record book on site. This book must be shown to an authorised WorkCover inspector within 24 hours of any request.

Example of a Test Result Sheet

Equipment type		Equipment number	
Date of Inspection		Equipment Class	
Lead Length (in metres)		Current consumption or rating	
Lead visual inspection check list			
Tick the appropriate box		Compliance	Non compliance
Plug and socket are clear or moulded			
Correct polarity and correct wire colours			
Cable insulation is in good condition			
Conductor connections are NOT soldered			
Appliance Visual Inspection Check List			
Case of equipment is in good condition and covers are in place			
Electrical data plate in place and ventilation holes clear			
Electrical controls and switches in good order			
Equipment mechanical safety devices operational			
Motor brush caps intact and in good order			
Appliance / Lead Electrical Test Results			
Earth resistance between case/socket & plug earth pin			
Insulation resistance between plug earth pin & active/neutral			
Description of Actions Taken			

15.0 Tagging Equipment

Note that to be compliant equipment must be identified by a visible and durable tag before it is used.

Tag Colours

The WorkCover Authority requires a tagging system that uses coloured tags to identify the month that testing was carried out. The same method detailed below will be used in this course.

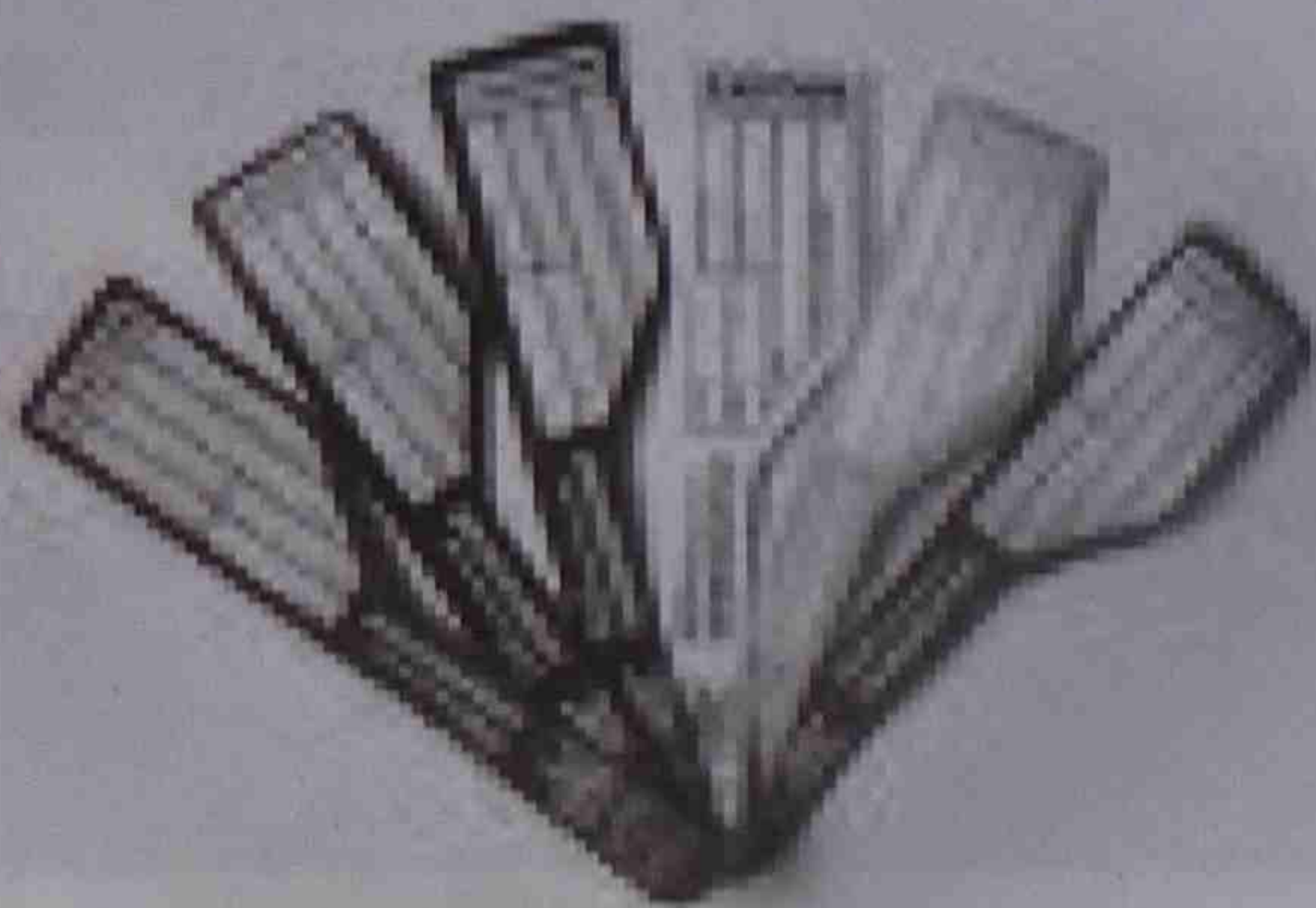


Table of labelling periods (New South Wales Only)

Colour of Tag	First Month to be Issued In	Second Month to be Issued In
Red	January	September
Blue	February	July
Orange	March	November
Green	April	August
White	May	December
Yellow	June	October
Black	Yearly	
Burgundy	5 Yearly	

The colouring of tags makes it easier to identify out-of-date tags visually.

Fitting a Tag

The tag is to have all the details filled in and signed by the person who did the testing.

The tag is then fitted to the cord and locked into place to prevent accidental removal. In cases of: leads in domestic construction projects; and for appliances where the tag has a life of 3 months, the correct coloured monthly tag must be fitted. The tag will then be valid for three months after it is fitted.

Note that it is required by the Code of Practice that all tags used must:

- Be durable
- Be non-metallic
- Be self adhesive or positively secured
- Be incapable of re-use
- Have a bright, distinctive surface

Fitting a Yearly Test Tag

Step 1

Write out the details on the tag



Step 2

Peel back the sticky cover



Step 3

Stick the tag onto the lead



Step 4

Use pliers to insert
the plastic retaining clip



The Finished Product