Learning resource

Demonstrate and apply knowledge of safeguards for use with portable electrical appliances

(level 2, credits 3)

Trainee Name: _____

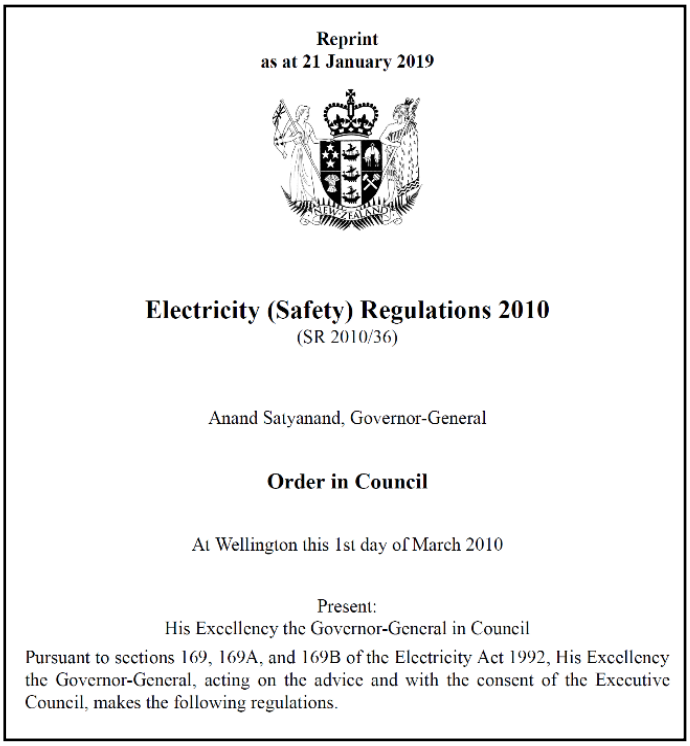
Acknowledgement

Copyright to the photos and images marked are owned by Toi Ohomai Institute of Technology and are used with Toi Ohomai's permission. Skills gratefully acknowledges Toi Ohomai's assistance.

Contents

Introduction

The Electrical Safety Regulations (ESR) is an important document in the electrical trade and you will need to put some time into learning it if you want to become an electrician. It is available online if you do a search for it. *You can download a copy free of charge.*



Reprint
as at 21 January 2019

Electricity (Safety) Regulations 2010
(SR 2010/36)

Anand Satyanand, Governor-General

Order in Council

At Wellington this 1st day of March 2010

Present:
His Excellency the Governor-General in Council

Pursuant to sections 169, 169A, and 169B of the Electricity Act 1992, His Excellency the Governor-General, acting on the advice and with the consent of the Executive Council, makes the following regulations.

ESR 89, sets out the legal requirements for the use of hand-held appliances in certain high-risk situations.

It goes through what those situations are and what precautions must be taken when using a hand-held appliance in those situations.

“Safeguard” is an electrical jargon term that is used to describe electrical safety measures and equipment. We are going to discuss the safeguards used with portable appliances to provide extra electrical safety.

An example would be a residual current device (RCD). The safeguards referred to in ESR 89 are:

- RCDs
- Double insulation
- Isolating transformers
- Safety extra-low voltage (SELV)
- Supply voltage ≤ 55V AC to earth
- Monitored earth

Learning Objectives

At the end of this study guide, you should know:

- Demonstrate knowledge of basic electrical protection;
- Demonstrate knowledge of regulations covering portable electrical appliances safeguards;
- Describe safeguards and situations requiring safeguards;
- Explain the operation of a Residual Current Device;
- Explain the operation of an Isolating Transformer;
- Explain the construction of a Double Insulated Appliance, and identify the symbol; and
- Describe testing requirements for electrical safeguards.

Part 1: Electrical protection

Before we deal with safeguards, it is important that you have a basic knowledge of electrical protection for people and property.

Electrical protection (such as circuit breakers or fuses) is required to protect people and property. Adequate safety relies on the protective devices operating quickly and efficiently to disconnect the circuit from the supply under fault conditions.

If a live conductor accidentally touches earth or an earthed part of the installation or appliance, the high current that flows (because of the earth wire), will trip out the protective device and quickly disconnect the circuit that has the dangerous fault.

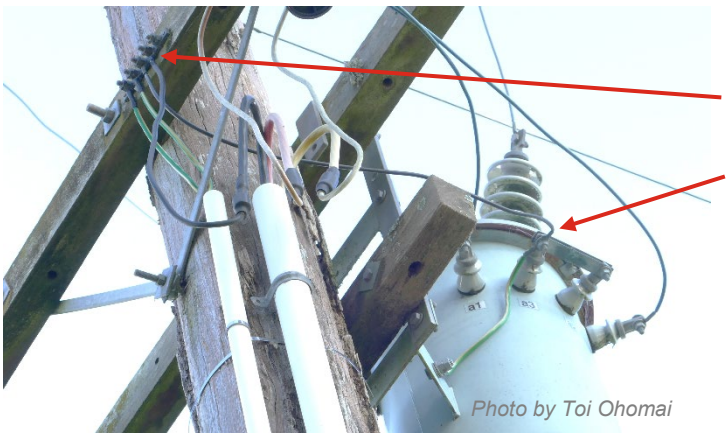


Photo by Toi Ohomai

The way that we achieve this for earth faults is to ensure that a low resistance electrical path to the general mass of earth is always present - in the form of an **Earth wire**.

In New Zealand, the first step to achieving this fast disconnection is the "**Earthed Neutral**", which means that the neutral of the supply is connected to earth (earthed – effectively connected to the general mass of earth) at the supply authority's local distribution transformer.

Next, we connect the neutral to earth many more times, once at each electrical installation. And then we connect all the "at risk of electrical faults" metal parts of the electrical installation to the earth as well. This effectively makes the metal parts directly connected to the neutral via the earth wire. *Why? Read on.*

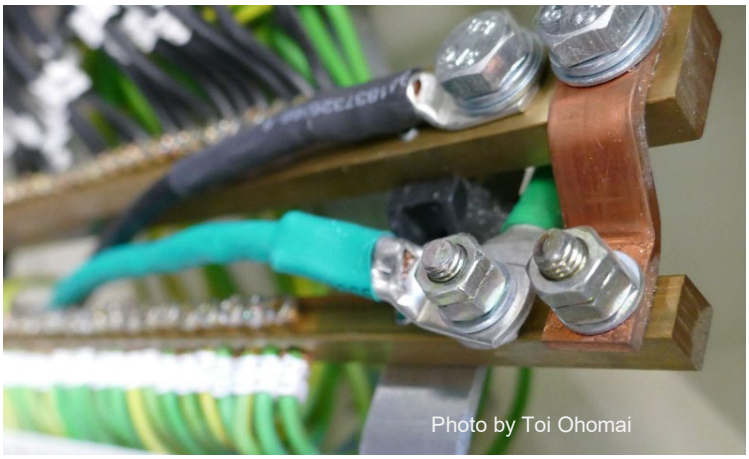


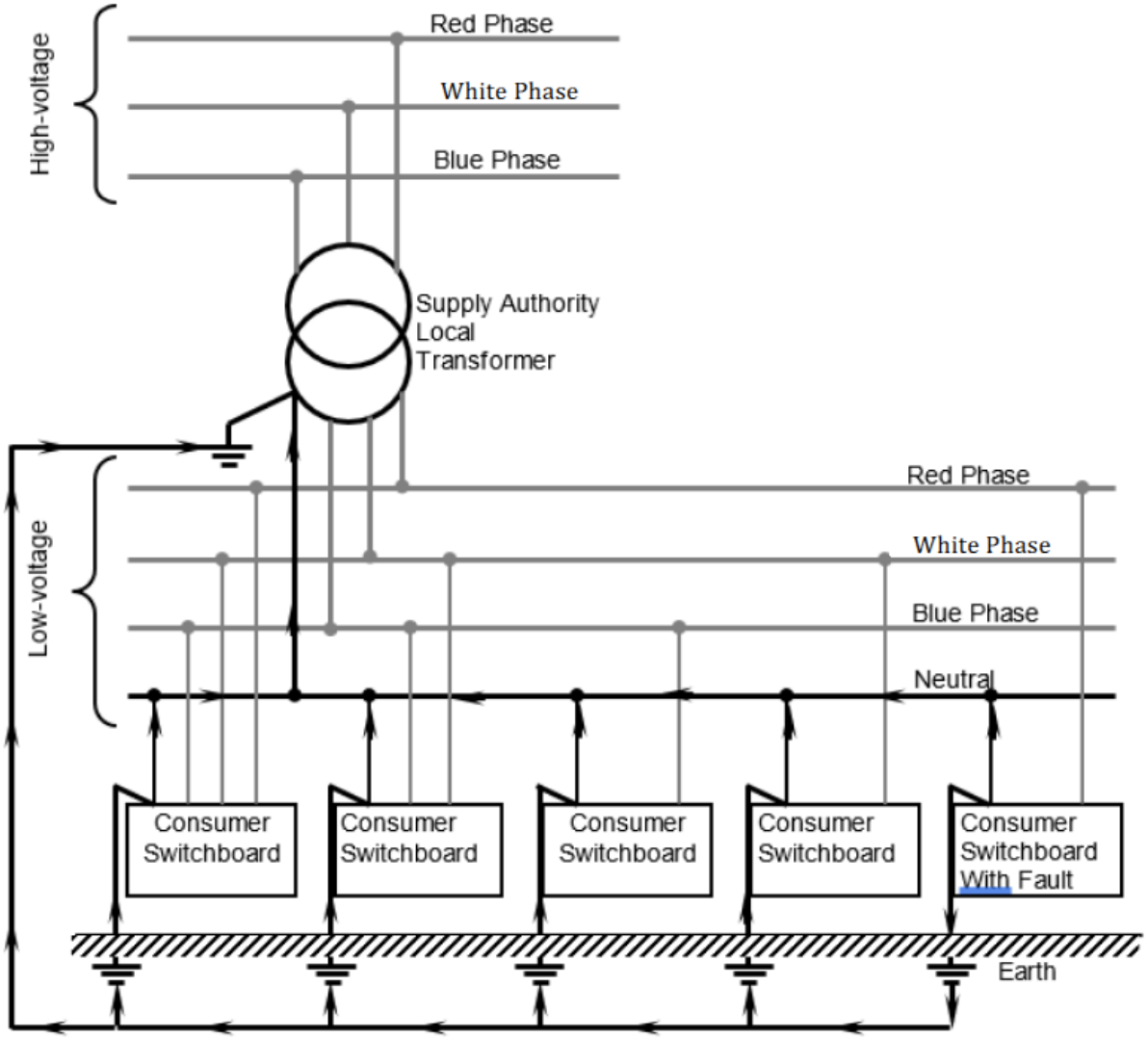
Photo by Toi Ohomai

The Multiple Earthed Neutral (MEN) System

This system means that the earth is connected to the neutral conductor numerous points as follows:

- The source of supply (Local distribution transformer);
- The main switchboard of the users' premises, and at every other users' main switchboard; and
- At other intermediate points along the distribution line.

These earth connections create multiple parallel return paths to the neutral.



If a phase to earth fault happens, heaps of current will flow straight to the neutral via the earths. The high fault current is dragged out of the phase via the protective device which goes *wahoo*! …*way way too much current flowing*!

The protective device will trip and remove the supply from the dangerous circuit. The deliberate high current flowing through the earth to neutral short circuit is wanted to make that circuit protection device act quickly – the more current, the faster they trip, and the faster things are made safe.

If you look at the diagram above, you can see that if a fault occurs, the fault current can flow through multiple earth and neutral paths back to the transformer, each one helps drag more fault current through the protective device.

One other feature of the MEN system is that, should the neutral be broken, and the same fault existed, then the fault current can still flow back to the transformer through a bunch of alternative paths (as the arrows show above).

Summary:

- Phase touches earth or earthed metal - bad.
- The earth is connected (multiple times) straight to the neutral.
- Heaps of current can flow through the “controlled short circuit”. The “*heaps of current*” is being supplied through the protection device.
- The protective device goes *wahoo!* (that isn’t actually an electrical term by the way).
- The high current trips out the protection device fast as! The faster the better.
- The faulty circuit is made safe by being removed from the supply.

And then you turn up to fault find because the circuit breaker tripped. You find the dangerous fault and you fix it, nice!

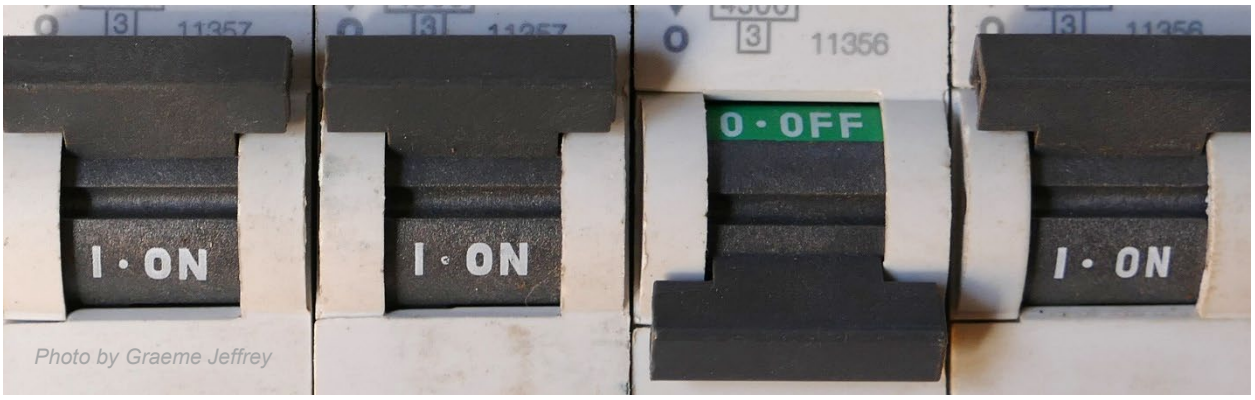


Photo by Graeme Jeffrey

Earthing electrical equipment

The regulations and Standards specify what must be earthed.

In summary: any metalwork that forms a part of an electrical installation or *works, fittings or electrical appliances wherever the metal is not fully isolated from any live parts or earth or is located within arm's reach of the live parts or earth.

** For a definition of "works" see the Electricity Act - 2 (interpretations), another important document you will need to study and is free to download from the internet.*

Exposed conductive part - *see AS/NZS 3000 1.4.53*
Extraneous conductive part - *see AS/NZS 3000 1.4.54*

Earthed Metal-cased Electrical Appliances (Class 1 appliances)

Appliances with metal casings (microwave, dishwasher, fridge, stove etc), may become "live" at up to full mains voltage if there is a problem that causes a live connection to the casing. This is an **extremely** dangerous condition. Anyone touching the case is likely to receive a severe or fatal shock.

- To safeguard against a fatal electric shock in this situation, the metal casing is required to be earthed.
- This gives the fault current a very low resistance alternative to flow back to the power source rather than through a person touching the case at the time of the fault.

Earthing portable appliances

The metal frame or case or any exposed metal of portable electrical appliances that could accidentally become alive, must be earthed by connecting an earth conductor to it and to the earth pin of the supply plug.

The Earth pin of the plug is longer than the other two pins so that it is first to make contact and the last to break contact when the plug is withdrawn.

Important note

- An appliance that does not solely rely on a single layer of basic insulation but also relies on exposed metal being earthed is called a Class I appliance. *See AS/NZS 3000 1.4.27*
- An appliance with two layers of insulation, or reinforced insulation and metal that is not earthed is called a Class II appliance. *See AS/NZS 3000 1.4.28*
- An appliance that relies on SELV (separated extra low voltage) protection is called a Class III appliance. *See AS/NZS 3000 1.4.29*

Double insulation

Double insulation is just that, double layers of insulation protecting live conductors. Double insulation is used extensively in the electrical industry, in electrical cables and flexes for example.

- Electrical fittings and accessories, electrical appliances, cables and cable terminations can all be made to be double insulated.
- Something that is double insulated has its normal basic insulation and then a secondary or supplementary layer of insulation around that again, *see AS/NZS 3000 1.4.60 for more information.*

As an alternative to earthing the metal, the manufacturer of an appliance may choose to put a double layer of insulation between any live conductors and the exposed metal. This gives double protection and makes sure the metal can't become alive.

A great deal of appliances are double insulated. They have at least two layers of insulation between any significant conductive material and their live conductors.

Any exposed conductive parts have no connection to earth either, in fact, if the exposed metal somehow got earthed, the protection the double insulation gives would be cancelled out and the user could be exposed to possible electric shock. This could happen if a fault in the MEN system causes the metal part of the appliance to become alive.

The outside of a double insulated appliance is kept isolated from earth and provides protection for the operator in a similar way that the Isolating transformer provides protection, i.e. there is no possible current flow that can happen by touching the appliance case.

The international symbol that indicates that an appliance is double insulated is a square within a square.

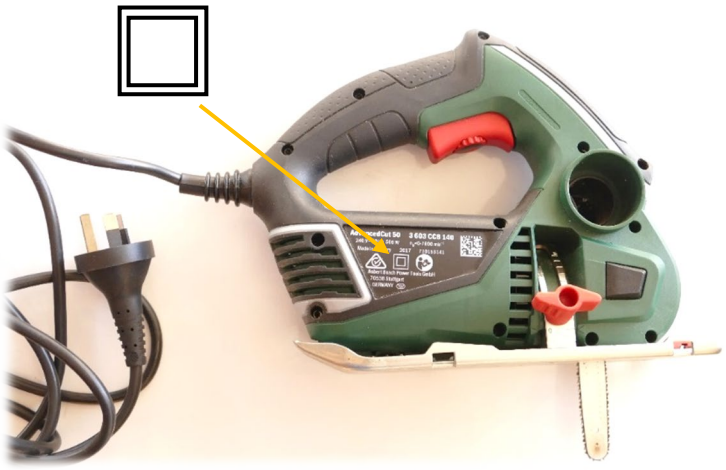


Photo by Graeme Jeffrey

Examples of commonly double insulated appliances.

While not all of these types of appliances are always double insulated, often they are. You will need to check on the label to see if a particular appliance is in fact double insulated or not.

- Hand-held drills
- Hair dryers
- Portable fans
- Angle grinders
- Electric leaf blowers

Temporary switchboards

While not a hand-held portable appliance, temporary switchboards need a mention as they generally supply portable appliances – particularly on building sites.

Temporary switchboards need to:

- Be adequately protected against the weather.
- Be positioned close to where the work is, to minimise the use of extension cables.
- Be positioned to avoid accidental mechanical damage.
- Be suitable and provide enough fixed wired socket-outlets to all users on site (sometimes through an auxiliary socket-outlet panel).
- Be RCD-protected.
- Have a Certificate of Compliance (CoC), Record of Inspection (RoI) and Electrical Safety Certificate (ESC).

Photo by Graeme Jeffrey

Situations requiring safeguards

Portable electrical appliances require a higher level of electrical safety than some other electrical equipment, because of how they are used.

- Hand held appliances are likely to be taken to, and used in, places that are more electrically dangerous such as outside, in damp places or on building sites.
- If you are using one, you will more than likely be gripping it in your hands. If a fault occurs, you will not only have good contact with it, you may also not be able to let it go because of the involuntary muscle contraction that an electric shock can cause.

Photo by Toi Ohomai

- Because they are more dangerous to the user, hand-held (portable) appliances will often need to be used with a safeguard and if used for business, they will also need to be tested for safety. The tests must be carried out to ensure the appliance is electrically safe.

The table on the following page features information taken from the Electrical Safety Regulations - regulation 89. It sets out the different high-risk situations identified and what safeguards are required for hand held appliances used in those situations.

High risk situation for hand held appliances *(ESR 89)*	Examples/ explanation for each situation	Suitable safeguards
Using appliances while in a conductive substance or situation	The person is partly or fully submerged in something conductive i.e. like while cleaning a water feature, working in a marine environment or washing down vats.	Use a ≤ 250V AC supply (between conductors) that is isolated from earth together with a fixed wired continuous flex to supply the appliance; or Use an RCD (Residual Current Device) and double insulation together; or Use an SELV (Safety extra low voltage source) supply.
Using appliances in cramped spaces.	Anywhere physical movement is severely restricted or obstructed, i.e. a mechanic working on a vehicle, working under a low to the ground house, in a crawl space.	
Using appliances in a damp room.	A bathroom or shower room etc.	Use a ≤ 250V AC supply (between conductors) that is isolated from earth; or Use a double Insulated appliance; or Use an RCD (Residual Current Device) to supply the appliance; or Use an SELV (Safety extra low voltage source) supply; or Use a monitored earth circuit; or Use a voltage to earth that does not exceed 55V AC.
Using appliances outdoors.	Anywhere that is outside.	
Using appliances in a building under construction.	Any building or structure that is under construction.	

Note: Consideration needs to be given to protecting the extension lead if a portable appliance used in a high-risk situation is supplied via an extension lead.

Residual current devices (RCDs)

ESR 24 and AS/NZS 3000 2.6 specifies the requirements in terms of operating current and time for RCD's.

The essential requirements are as follows:

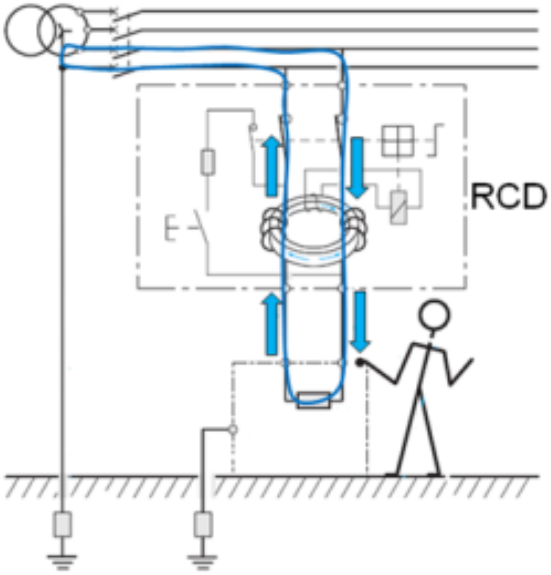
- RCD's used for personal protection must operate within 300 milliseconds, at a maximum leakage current to earth of 30 milliamperes, except in the case of protection of young children (kindergartens, child care centres and the like) where the maximum leakage current to earth is 10 milliamperes.
- RCD's used for patient protection must operate within 40 milliseconds, at a maximum leakage current to earth of 10 milliamperes.

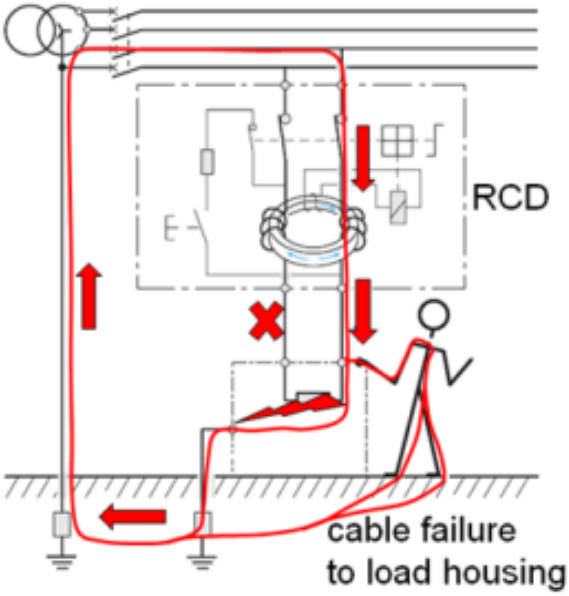
RCDs disconnect the supply extremely rapidly (as fast as 30 milliseconds) if for some reason current "leaks" or is diverted out of a circuit.

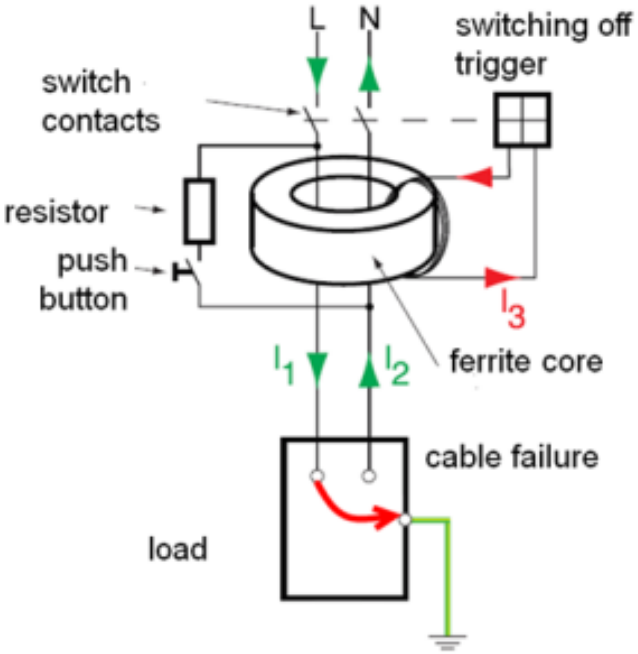
They operate on the principle that under normal conditions, the currents flowing in the **Phase** and **Neutral** conductors of a circuit are equal. **Under Earth** fault conditions (as in an electric shock) some current is diverted to earth through the victim.

The Phase and Neutral currents are then no longer equal. If an imbalance is detected by the very sensitive sensing coil and current amplifier, the RCD will trip to disconnect the power.

RCDs will not trip if phase and neutral (only) are touched and if no current is leaking out of the circuit. While quite unlikely to happen, you need to be aware that it is possible to get electrocuted even with an RCD.







Normal Operation **Fault to Earth**

RCD protection is particularly suitable for providing extra protection for users of portable tools and equipment, and in other situations where there is a high risk of mechanical damage to electrical appliances or cords causing short-circuits to Earth.

The protection given by an RCD, (given that it will operate at 30mA, and in 300ms) means that the likelihood of death or injury is greatly reduced.

Some current must flow out of the circuit for an RCD to operate. A user will receive a small shock, but the severity of the shock is limited so as not to cause any organic damage to a user.

Earth leakage or residual current devices have a test button fitted, which should be operated at regular intervals. Unless operated from time to time the device may “freeze” and not trip when required.

When using an extension cord, it’s necessary to use an RCD or other safeguard to protect the cord too, even if the portable tool or appliance is double insulated.

Portable RCDs need to be voltage dependent, meaning they will return to off if the supply is lost and will have to be manually reset when the supply is restored. This is an additional level of safety to prevent the portable appliance or tool from powering up when you do not expect it.

Isolating transformers

The down side of all the earthing we were talking about earlier is that if we are standing on the ground, and the ground is connected to the neutral, then if we touch phase, we become a path for current to flow from phase to neutral.

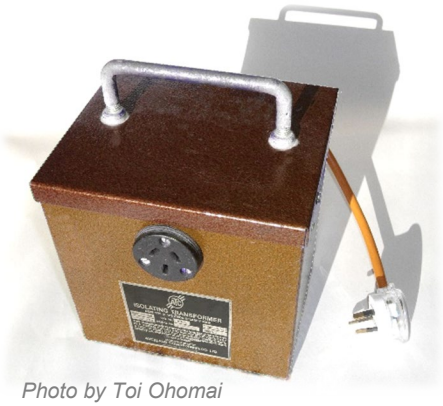
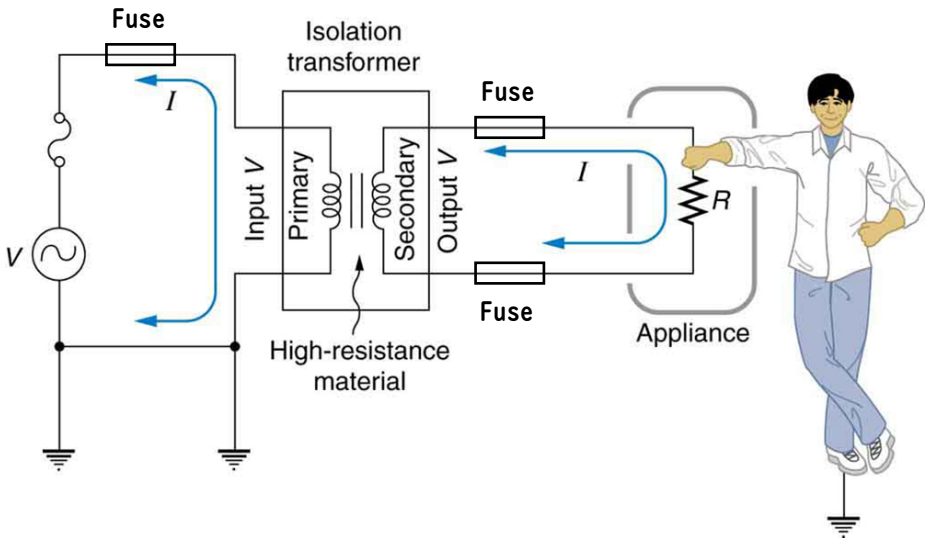


Photo by Toi Ohomai

To stop this from happening, an **isolating transformer** is great.

A transformer delivers power from the primary to the secondary via magnetism and without a physical connection. The secondary is electrically isolated from the primary winding and the primary power supply.

That means, you can set up a transformer secondary to provide a power circuit to run your hand-held appliance that has no connection at all to earth.



The result is, even if you did happen to touch a live output wire on the secondary, the current doesn't have any connection with the ground and wont even bother trying to flow through you as there is no return path to the supply earth. You are completely safe from getting a shock even if you are touching the live wire.

Touch both secondary wires of a transformer at the same time and it is a whole different story. You will get a sizable electrical *wallop* as the current will flow from one wire through your body back to the other wire. If it didn't, your appliance wouldn't work either.

- If a 230V single phase earthed neutral supply is connected to the input winding of a 1:1 isolating transformer, the output is also 230V. The output is taken through fuses (one in each lead) and is connected to a three-pin socket outlet.
- If two output sockets are provided on an isolating transformer, the Earth pins of the plug sockets must be bonded together but not connected to Earth.

Some isolating transformers may be fitted with one output fuse and one thermal cut-out instead of two fuses.

The purpose of bonding the earth pins of the two socket outlets together is to provide electrical safety when more than one appliance is supplied by the transformer. This electrically bonds their metal cases (if they have them) together.

- If one of the appliances were to develop a phase to frame fault and the other a neutral to frame fault, a current would flow through the interconnected earth pins and would "blow" one or both of the output fuses.
- It follows that as the number of electrical appliances being used simultaneously from an isolating transformer is increased, the chance of faults developing as described above increases, as does the possibility of a broken or disconnected earth wire from an electrical appliance.

For this reason, it is recommended that for maximum protection, only one electrical appliance should be used from an isolating transformer at a time.

Testing requirements

Fixed RCDs

There is no mandatory requirement set out for regular checking/testing of fixed wired RCDs. Manufacturers usually recommend operating the trip function of RCDs at regular intervals, such as monthly.

- It is important that the push button test be carried out regularly to ensure that the operating relay and contacts have not become “frozen” through lack of movement.
- AS/NZS 3000 8.3.10.2 requires a **push button test** (providing there is documentation or markings that confirm that the RCD is a type A RCD) or a test using test equipment, when an RCD is installed.
- The result of this test is that the RCD must disconnect the supply.

Portable RCDs

Table 4 of AS/NZS 3760 sets out the requirements for testing the operation and trip time of portable RCDs in (business) service.

- The environment that the RCD is used in makes a difference to how often it needs to be done.

Appendix H gives some guidance to testing RCDs and 2.3.3.4 gives the maximum trip time for RCDs as follows:

RCD type	Test current *(AC mA)*	Maximum tripping time *(ms)*
Type I	10	40
Type II	30	300

Portable isolating transformers:

1. A portable isolating transformer must be tested in accordance with the current AS/NZS 3760 – Appendix F.
   The tests for a class I isolating transformer are as follows:
   - An insulation resistance test between the primary (input) winding and the secondary (output) winding. Minimum required reading is 1 MΩ.
   - An insulation resistance test between the primary (input) winding and the metal parts of the case. Minimum required reading is 1 MΩ.
   - An insulation resistance test between the secondary (output) winding and the metal parts of the case. Minimum required reading is 1 MΩ.
   - An earth non-continuity test (insulation resistance test) between the primary supply earth and the secondary output earth to ensure that there is no connection between the two. Minimum required reading is 1 MΩ.
   - An earth continuity test between the earth pin of the supply plug and the metal parts of the case. Maximum allowable 1 Ω.
   - An earth continuity test between the earth pins of the secondary (output) sockets if there is more than one. Very low, ideally < 0.1 Ω.
2. The essential test for any double insulated appliance is to ensure that there is no earth conductor connected to the case i.e. the appliance is completely segregated from earth, or the protection provided by the secondary insulation will be nullified.

Part 2: Inspecting handheld appliances

Visual Inspection of Appliances

Missing Screws

Most portable electrical appliances consist of a number of parts that are assembled and held together by screws. Before an appliance is used it should be checked to ensure all visible parts are secure and in good condition.

Because the cover is missing from the drill shown, there is the possibility of electric shock from the exposed internal parts (the commutator and carbon brushes). **This is extremely dangerous!**

Cracked Body or Handgrip

Parts and covers that are cracked, damaged, burnt, deformed etc. will also make an appliance unsafe.

A crack in the plastic case of a double insulated appliance means one layer of insulation (the secondary insulation) is incomplete, so the danger of electric shock is present.

A broken part may fall off during operation.

There may also be internal damage from the event which caused the cracking in the first place. Foreign matter may enter the appliance through the crack or in some cases; sparks may be emitted through the crack.

Insulating tape over such defects is not a satisfactory repair. Always be wary of an appliance which has insulating tape covering part of its body or mechanism and do not use it!

Controls (levers, knobs etc.) must also be visually checked for missing screws and any obvious damage such as looseness, breakage etc. – this is important!

Missing Handles

Appliances are fitted with handles to allow them for use in a safe and controlled manner. Handles may be adjustable and removable. Many power tools have handles that can move to allow comfortable and safe use by left or right handed operators. Do not use an appliance when handles are missing, faulty or not properly secured, it is unsafe.

Two power tools are shown below, an Angle Grinder and a Drill.

The handle, which can be fitted either side; is missing altogether

The handle is correctly fitted

Powerful pistol drills require two-handed control. With the exception of very small drills used for fine work, pistol drills will have a handle fitted in a manner that allows safe and controlled operation. Always use this handle.

This is dangerous - no handle!

The Pistol Drill shown has a bit for boring timber.

Using the drill without the handle securely fitted can lead to serious injury particularly if the drill should jam whilst boring the timber.

The handle on this Pistol Drill is secured with a wingnut that must be tight.

The handle fits around a machined collar and is adjustable.

Missing Guards

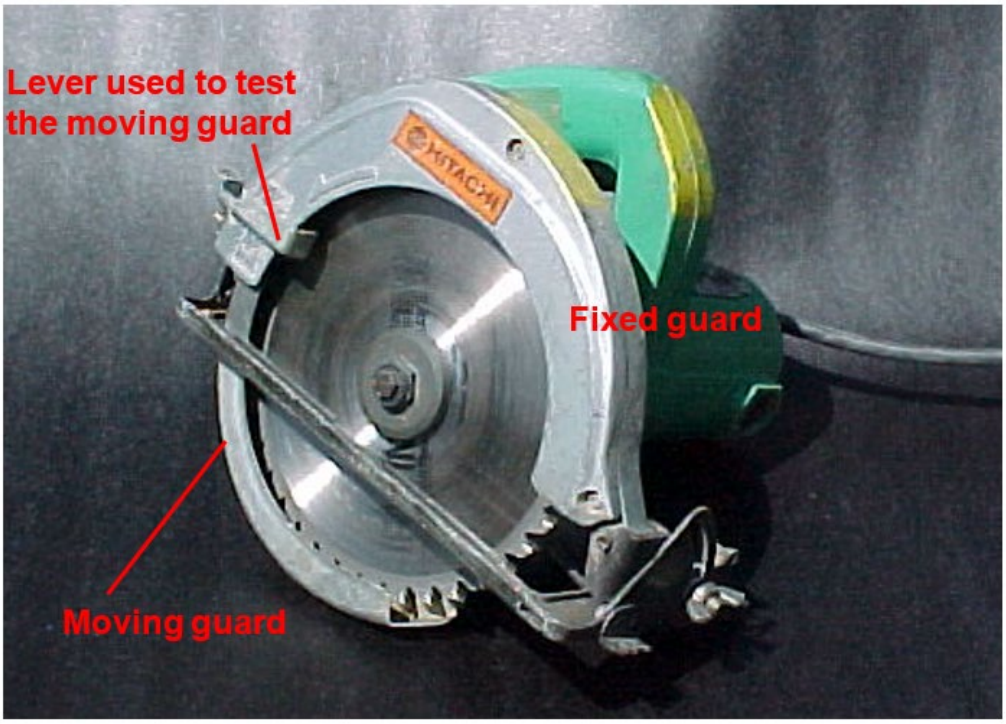
Guards fitted to power tools and other portable appliances, are there to protect the operator and other people nearby, from injury. They must always be in good condition and securely fitted. Never use an appliance with a faulty or missing guard!

The guard of the disc grinder has been removed. This is very dangerous!

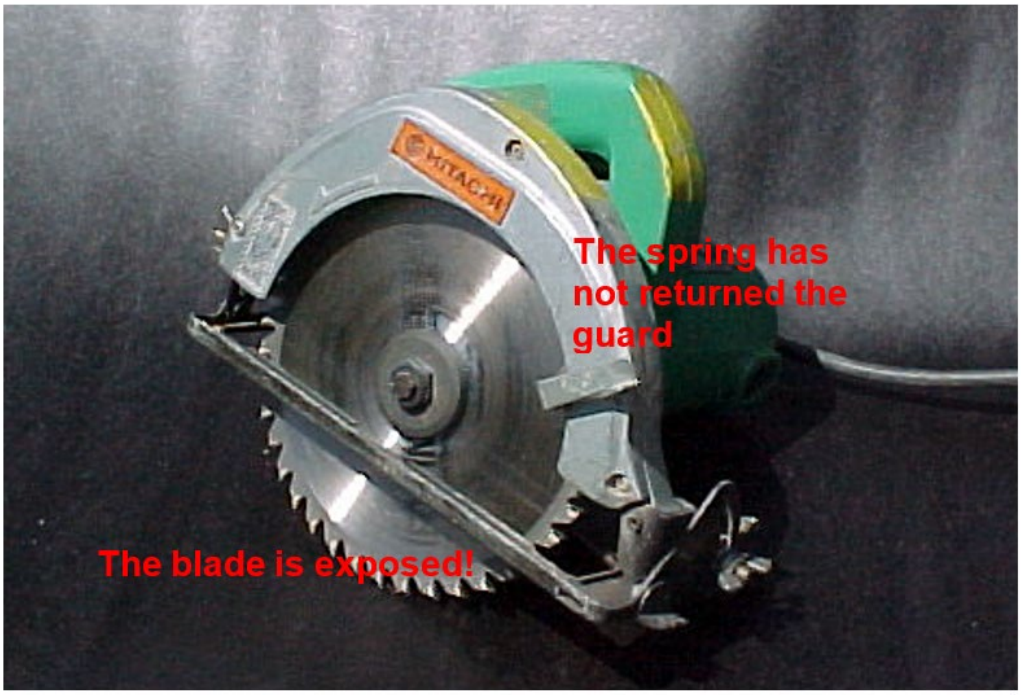
If the angle grinder is used as shown, it will shower sparks in all directions and could easily injure the operator's hand.

If the grinding disc becomes damaged, it could shatter and cause fragments to become airborne. This has the potential to injure the operator and bystanders.

In the figure below, a portable saw (commonly known as a skill saw) is shown with the guard correctly positioned and working properly,



The next figure shows the guard jammed open (this would occur if the return spring was broken). This is very dangerous.



Drill chucks and blade clamping mechanisms

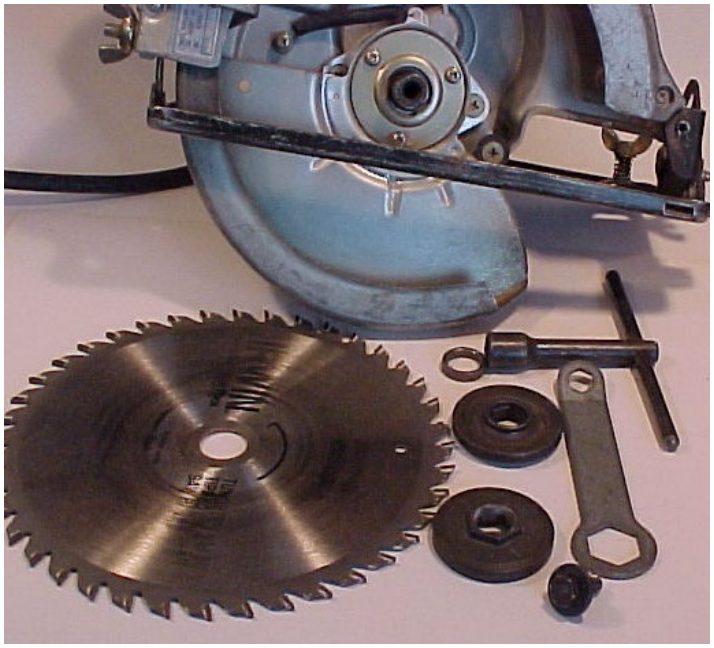
To allow power tools to work safely and efficiently, any tool clamping mechanisms must be in good working condition as well as the drill bits, saw blades etc. being sharp.

Chuck keys must be used to tighten drills where a Key-type Chuck is fitted

Keyless-type Chuck (these are tightened by hand)

Clamping systems for saw blades or grinder wheels often consist of parts such as spacer rings, nuts, bolts and other specially shaped parts. Often special tools come with the tool to use when removing or fitting blades.

There are often many parts involved in a blade clamping system. All parts must be in good condition and fitted in the correct order using the correct tools (the two tools used with the saw are shown).



Visual inspection of cords and plugs

Before using an extension lead or a portable appliance, check the condition of the flexible cord, cord grips and the fittings (plugs and cord connectors).

The flexible cord must have no damage such as splits resulting from squashing, nicks, cuts, burn marks, distortion (excessive twisting) due to careless use.

This is important because the outer sheath provides strength, mechanical protection and a secondary layer of insulation.

Some of the typical signs of damage are shown below:

The nick in this flex exposes the primary insulation on the conductors within the flex. Sometimes a flap of the outer sheath will partially cover such damage.

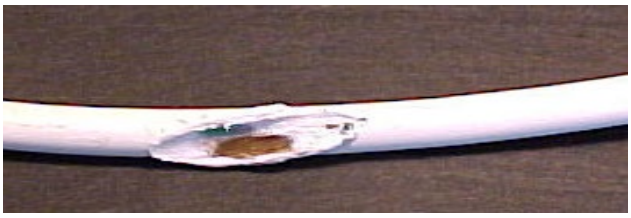
This is usually the result of careless use in tugging the flex after jamming in a doorway or catching on a sharp object.

The "nick" in this flex exposes the copper conductors.

The blades of a powertool such as an electric planer (buzzer) can easily inflict the type of damage shown.

The split in this flex exposes the primary insulation. Sometimes the flex may also look flattened.

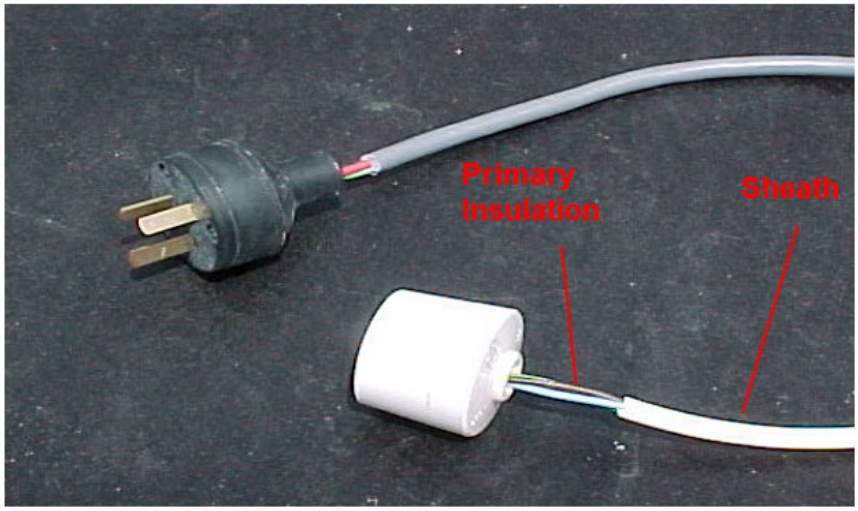
Where a lead is run over it will be squashed flat and may split as shown. The conductors may have been squeezed through the insulation and could short out.



Burn marks are typically found on soldering iron leads where the lead has come into contact with the tip of the hot soldering iron.

Cord - Gripping Systems

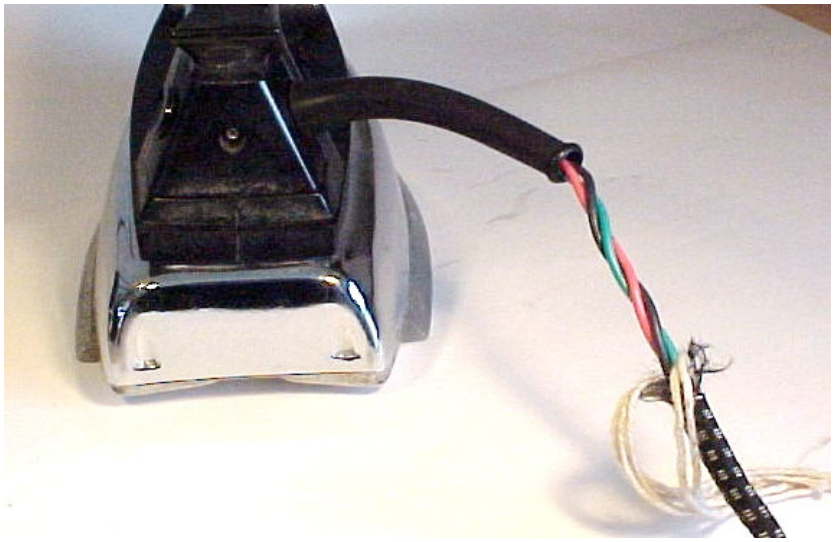
When cord grips fail to clamp the sheath of a flexible cord, the primary insulation is exposed. This is a dangerous situation and appliances with cord grips that are not effective should never be used.



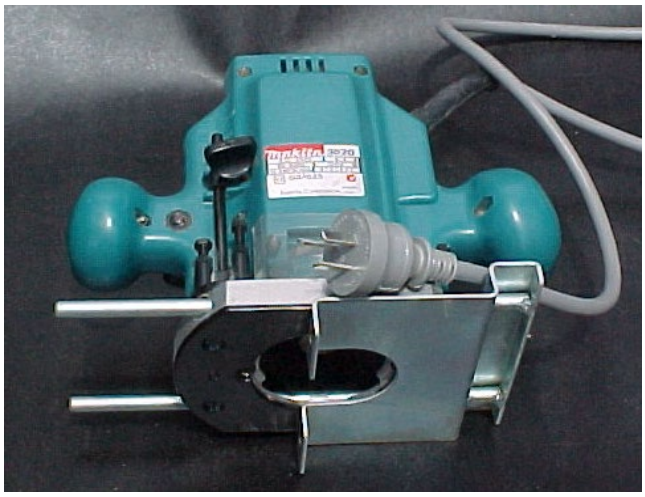
Cord gripping systems are quite good on some plugs and appliances but quite poor on others.

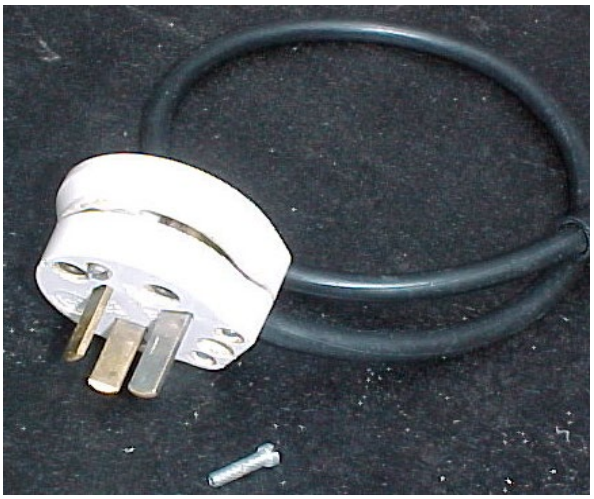
Even good cord gripping systems can fail or come loose, or the flex may not have been installed well in the first place.

Never use an appliance with its lead in the condition shown below. The whipping of the cord sheath has failed on the iron - this is dangerous.



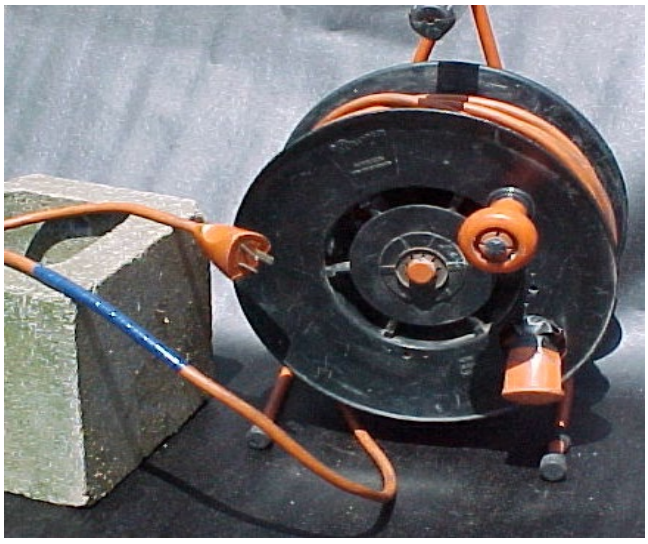
Most portable appliances have plugs that are moulded on to the lead at manufacture. These plugs usually have far better cord grips than those used on the plug and cord connector shown on the right (these fittings are screwed together rather than moulded on).





The side entry plug shown is of the type assembled with screws. One of the screws is loose and the other has fallen out - this is very dangerous - never use a portable appliance when the plug is incomplete, damaged, or has any loose parts or missing screws.

The extension lead shown on the right has several defects.



The plug has a bent pin, there is insulation tape covering a damaged area and tape covering a fault at the cord connector.

Tape is not satisfactory for such repairs.

Replace the extension lead, or shorten it and replace the plug and cord connector.

Do not use a lead in this condition.

Never use a rolled up or coiled extension lead, this leads to overheating of the lead.

Do not tie knots in flexible cords or extension leads, as this places unnecessary stress at the entry point to the fittings.

Leads that have a twisted appearance (often caused by incorrect coiling) should be carefully untwisted.

If the twisting seems permanent then the lead may have overheated, it is old, or it has been incorrectly coiled and then pulled out straight rather than uncoiling it.

Do not use leads in this condition – replace them.

Checking the controls and operating the appliance

Controls of portable appliances may be simple - such as an on - off switch or quite complex, such as:

- electronic speed control
- forward and reverse control
- mechanical percussion control (typical on a hammer-drill)
- mechanical speed selection (two speed gearbox)
- mechanical control of oscillation (typical on a jigsaw)
- spindle lock and reverse pulse switch ("quick" angle grinder)
- dual heat selection (heat guns, soldering irons etc.)

Test that the controls are in good condition and working. The on - off switch is particularly important for stopping in an emergency if something goes wrong. Many tools have a button to latch the switch in the "on" position. The switch must be pressed again to release this latch mechanism and turn the motor off.

Labelling of faulty appliances

If an appliance is found to be faulty then it should be labelled and sent for repair.

- Repairs must be carried out by a competent person. People who are competent to safely repair portable appliances are registered as such by the Electrical Workers Registration Board.
- Suitable levels of registration are: Electrical Inspector, Electrician, Electrical Service Technician and Electrical Appliance Serviceperson.

Of course, having a registration and licence alone is not sufficient. The ideal person for repairing power tools and portable appliances is the person who is not only licenced, but is also a trained and experienced specialist.

Labels for this situation are usually yellow in colour and marked "Out of Service". On the back of the label, there is space to describe the defects along with the date and time.

Some employers have their own labels and procedures where defects are found – make sure that you know the correct procedures at your workplace. If a proper label is not available, in an emergency, make one with a pen and some cardboard. Use twine, string, a cable tie or even insulation tape to attach it, just make sure the appliance won't be used.

There are other labels and documents used by some employers and service personnel.

There are Electrical Safety Certificates in accordance with the current AS/NZS 5762 that must be affixed by the person affecting any repair. These are dated and signed and have the registration number of the licensed repairer.

Then there are the test tags used by people who do regular routine testing of portable appliances, extension leads etc. These are wrapped around the lead of the tested equipment and show when the equipment was last tested and when it is next due to be tested.

Any user of the appliance needs to check that there is a current test tag before using the appliance.

Labels used for 'test and tag'

Table – Testing and Inspection Intervals for Electrical Equipment

Colours used for periods of the year

skills.
Grow by growing others

The Skills Organisation
0508 SKILLS (0508 754 557)
skills.org.nz