

Electrical Safety on Small Construction Sites

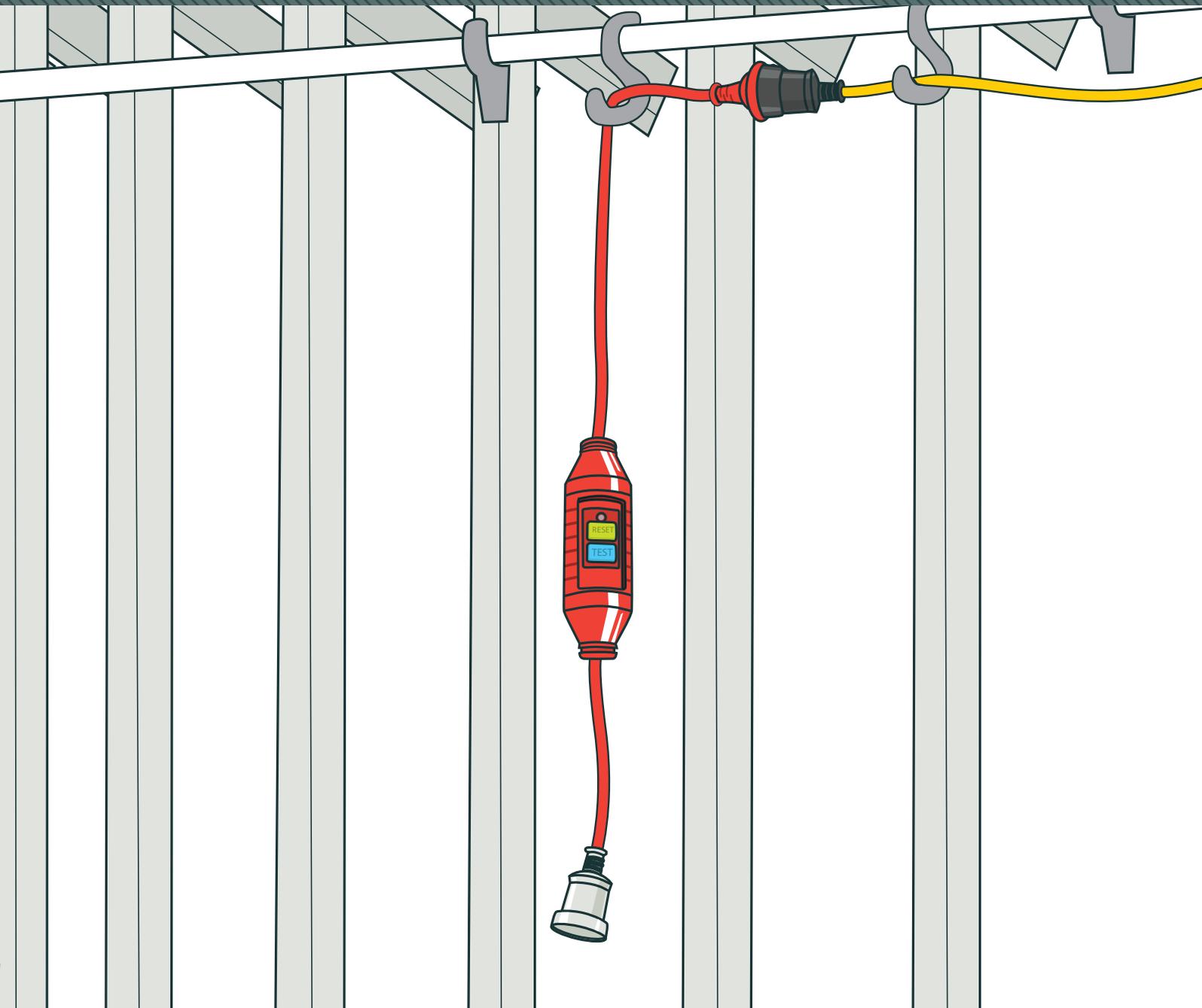


TABLE OF CONTENTS

01	INTRODUCTION	4
	What are the risks?	4
	Eliminate or minimise electrical safety risks	4
	Electric shock and serious injuries	5
02	ELECTRICITY SUPPLY ARRANGEMENTS ON A SMALL CONSTRUCTION SITE	6
	Work together to manage electrical safety risks	6
	What is a 'builder's temporary'?	6
	What certificates and inspections are needed?	7
	Where should a builder's temporary be located?	7
	How is electricity supplied to properties being renovated?	7
03	SET-UP AND ELECTRICAL SAFETY ON SITE	8
	Training and supervision	8
	General workplace facilities	8
	Emergency planning	8
	First aid	8
	Environmental hazards	8
	Look at what else is on site or nearby	9
04	RCDs, PSOs, LEADS, CORDS, PLUGS AND BATTERY-OPERATED EQUIPMENT	10
	Residual current devices (RCDs)	10
	Portable socket-outlet assemblies (PSOAs)	11
	Multi-boards	11
	Leads, cords and plugs	12
	Battery-operated equipment	13

05 CHECKING YOUR ELECTRICAL EQUIPMENT IS SAFE 14

Check equipment daily	14
Repairs	15
Testing and tagging	15

06 ELECTRICAL SAFETY CHECKLIST 16

FIGURES

1	One style of builder's temporary	7
2	Portable RCD	11
3	A PSOA designed for harsh conditions	11
4	Domestic multi-board	11
5	Arrange leads and cords to make sites safer	12
6	Double adaptor	13
7	Piggy-back plug	13
8	Repair tag	15



INTRODUCTION

This guide provides information about electrical supply and safety on small construction sites.

It is for a person conducting a business or undertaking (PCBU) who manages or controls a small construction site. The guide has ideas to help you control electrical risks and protect workers who use electricity. The checklist (Section 6) will help you to decide whether you are doing everything you can (so far as is reasonably practicable) to ensure that electricity is supplied and used safely.

You must engage with workers and have effective worker participation practices. This means giving workers a reasonable opportunity to express their views and to raise work health or safety concerns. Consider what workers have to say – for example, when identifying electrical hazards and deciding how to eliminate or minimise risks. Their views can help you to improve work health and safety.

WHAT ARE THE RISKS?

Death and serious injury can occur from exposure to electrical hazards on construction sites. Electric shock is the main risk.

The harsh conditions on many construction sites can damage electrical equipment and cables, and reduce their lifespan.

ELIMINATE OR MINIMISE ELECTRICAL SAFETY RISKS

The risk of injury from electricity is strongly linked to where and how it is used. You must find out if there are any ways to eliminate or minimise electrical safety (and other) risks.

- > You must first try to eliminate risks that arise from your work, so far as is reasonably practicable. If you can't eliminate a risk, you must minimise it so far as is reasonably practicable. This means you do what is reasonably able to be done to ensure health and safety in your circumstances – that is, what you know or ought reasonably to know.
- > Just because something is possible to do, doesn't mean it is always reasonably practicable. You must take into account and weigh up all relevant matters. Cost must only be used as a reason to not do something when that cost is grossly out of proportion to the risk.
- > As part of ensuring health and safety on your site, at the start of every day check for new workers, new risks, new equipment, and any changes to the site layout.

You must provide workers with the information, training, instruction and supervision they need to work safely. This includes suitable training on electrical risks on site, so that everyone knows how these risks can be eliminated or minimised.

You and other PCBUs on site (eg contractors) must ensure any electrical equipment you use or provide is operated safely and maintained so that it remains safe. You should take into account the nature of the work and the conditions. WorkSafe New Zealand (WorkSafe) recommends that you keep maintenance records.

ELECTRIC SHOCK AND SERIOUS INJURIES

You must notify WorkSafe if an electric shock exposes a worker or any other person to a serious risk to their health and safety, or if someone is seriously injured.

- > You must notify WorkSafe as soon as possible.
- > The notification must be made even if Emergency Services attend.
- > To notify WorkSafe ring 0800 030 040 or complete the online notification form at:
www.worksafe.govt.nz

FOR MORE INFORMATION

LEGISLATION

[Health and Safety at Work Act 2015 \(HSWA\)](#)

[Electricity Safety Regulations 2010](#)

WORKSAFE RESOURCES

www.worksafe.govt.nz

[Introduction to the Health and Safety at Work Act 2015](#)

[HSWA quick reference guide](#)

[General Risk and Workplace Management](#)



ELECTRICITY SUPPLY ARRANGEMENTS ON A SMALL CONSTRUCTION SITE

Electricity can be supplied to a small construction site through a temporary or permanent connection.

- > A builder's temporary (see below) provides an electricity supply at a worksite where there is no existing connection. Only a licensed electrical worker can install, connect, modify or move a builder's temporary.
- > An electrician can install a permanent connection to a mains supply at the beginning of the project.
- > Electrical work on properties being renovated typically feeds off the existing permanent switchboard, rather than a builder's temporary.

WORK WITH OTHER PCBUS TO MANAGE ELECTRICAL SAFETY RISKS

You and other PCBUS (eg contractors) working on the same site must, so far as is reasonably practicable, work together (consult, cooperate and coordinate activities) to manage electrical safety risks where you have the same health and safety duty.

- > Talk with other PCBUS about how electricity will be supplied and used in areas where your health and safety duties overlap. This will help to prevent any gaps in managing health and safety risks.
- > All contractors who use the electrical supply at the site must make sure their equipment is safe to use and without risks to others.
- > All electrical equipment should be RCD-protected. (RCD stands for Residual Current Device; see Section 4.)

Hiring companies must not hire out equipment that is electrically unsafe. They are responsible for testing and tagging hire equipment before you hire it.

WHAT IS A 'BUILDER'S TEMPORARY'?

A builder's temporary is also called a temporary supply switchboard. A builder's temporary:

- > gives builders and other tradespeople an electricity supply on a worksite where there is no existing connection to an electricity network
- > functions as a main switchboard and has one or more RCD-protected outlets
- > must comply with AS/NZS 3012 to be deemed electrically safe.

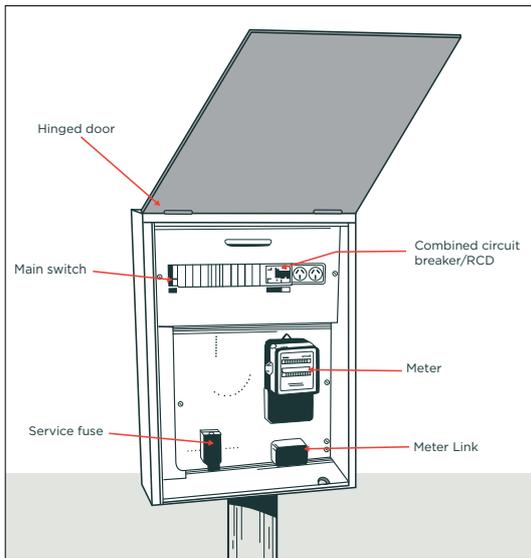


Figure 1: One style of builder's temporary

WHAT CERTIFICATES AND INSPECTIONS ARE NEEDED?

Before you can use a builder's temporary, an electrician must give you:

- > a Certificate of Compliance (CoC)
- > a Record of Inspection (RoI)
- > an Electrical Safety Certificate (ESC).

These documents guarantee that the builder's temporary meets New Zealand's electrical safety standards.

The builder's temporary must then have a periodic assessment at least every six months. A qualified electrical worker must check the switchboard and issue a Certificate of Verification (CoV) confirming that the switchboard complies with AS/NZS 3000 and AS/NZS 3012.

WHERE SHOULD A BUILDER'S TEMPORARY BE LOCATED?

Put the builder's temporary in a suitable location close to where electrical work will be carried out.

The most suitable location may not be the easiest place to set it up. But if a builder's temporary is not close to where electrical work is being carried out you may need extension leads – and extension leads are a potential electrical hazard. You can manage this risk by carefully planning where the builder's temporary should go. Consider where most of the electrical work on site will be done and how connections can be made without using too many extension leads.

HOW IS ELECTRICITY SUPPLIED TO PROPERTIES BEING RENOVATED?

Electrical work on properties being renovated typically feeds off the existing switchboard, rather than a builder's temporary. For domestic builds, the switchboard for the completed installation may be used for the supply.

This may:

- > be connected to one or more Portable Socket-Outlet Assemblies (PSOAs) or
- > have enough fixed wired socket-outlets to provide power to all users on site through an auxiliary socket-outlet panel.



SET-UP AND ELECTRICAL SAFETY ON SITE

Setting up safely on site will help to eliminate or minimise the health and safety risks that come with using electricity. Ask workers to share their ideas, experiences or concerns about how the site is set up.

TRAINING AND SUPERVISION

You must provide your workers with the training and supervision they need to work safely. Make sure that workers know how to safely operate the electrical equipment used on site.

GENERAL WORKPLACE FACILITIES

Your site layout must, so far as is reasonably practicable, allow people to enter, exit and move about without risks to health and safety – under normal working conditions and in an emergency.

EMERGENCY PLANNING

Your workplace must have an emergency plan. This should include information about how to evacuate the site, and how to notify emergency services. When preparing an emergency plan, you must consider the size and location of the worksite, the number and composition of workers, the nature of the work and its hazards, and workers' views.

FIRST AID

- > You must provide adequate first aid equipment for the site.
- > Workers must have access to that first aid equipment, and access to first aid facilities.
- > Workers must also have access to an adequate number of trained first aiders, either trained workers on site or other people (eg at a local medical centre or hospital).
- > It is good practice to have a CPR-trained person on site.

ENVIRONMENTAL HAZARDS

Electrical equipment can be damaged by harsh environments or working conditions, such as:

- > bad weather
- > exposure to dust, water, chemicals, steam and UV radiation.

Working with electrical equipment in wet and damp environments increases the risk of electric shocks. Adequate controls should be used, including – but not limited to – suitable personal protective equipment (PPE). (See Section 4 of WorkSafe's *General Risk and Workplace*

Management interpretive guidelines for information about the legal requirements around PPE.)
Workers using power tools should be able to work under cover from rain whenever possible.

As well as tools, consider other electrical equipment that workers may use on site. Workers should only use microwaves, kettles and other domestic appliances that are RCD-protected.

LOOK AT WHAT ELSE IS ON SITE OR NEARBY

You should identify any hazards that could cause reasonably foreseeable risks to health and safety.

HIDDEN ELECTRICITY CABLES AND OTHER UTILITIES

Hidden electricity cables and other utilities (eg gas pipes) should be located, shown on plans and marked.

OVERHEAD LINES

If working close to overhead power lines, check whether:

- > the electricity supply has been isolated. If isolation is not practicable then a minimisation control must be put in place, if it is reasonably practicable
- > minimum approach distances (MADs) have been identified (see Section 9 of WorkSafe's *New Zealand Electrical Code of Practice for Electrical Safe Distances* [ECP 34]).
- > people (such as scaffolders) and plant working near overhead power lines comply with the minimum safe approach distance limits.

You can use visual safety aids or taped markers to indicate where overhead power lines are.

RELOCATABLE BUILDINGS, CARAVANS AND OTHER VEHICLES

Relocatable buildings (such as prefabs), caravans and certain vehicles connect to an electrical supply by plugging into a special socket-outlet. The socket-outlet should be protected by an RCD.

All relocatable buildings, caravans and other vehicles supplied with electricity should have a valid Electrical Warrant of Fitness (EWOFF) issued by an electrical inspector. An EWOFF is valid for four years. A person supplying electricity to a relocatable building, caravan or other vehicle must make sure that it has a valid EWOFF before connecting it to power. It is an offence to connect it to power if its EWOFF has expired.

The supply cord can be included in the EWOFF. The cord does not require testing and tagging if it is RCD-protected. Supply cords must be kept away from sharp edges and treated like extension leads. Permanent supply leads should be raised on insulated supports, or buried inside a conduit in a marked location.

FOR MORE INFORMATION ABOUT FACILITIES AND OTHER WORKPLACE REQUIREMENTS

WorkSafe's *General Risk and Workplace Management* interpretive guidelines



RCDs, PSOAs, LEADS, CORDS, PLUGS AND BATTERY-OPERATED EQUIPMENT

RESIDUAL CURRENT DEVICES (RCDs)

All hand-held appliances, light sources and other electrical equipment used on a construction site must have protection against electric shock. One way to provide protection against electric shock is to ensure that all electrical equipment is supplied with electricity through an RCD.

An RCD constantly monitors the electric current flowing along a circuit. If an RCD detects a fault, it quickly disconnects the electricity supply in many situations where someone would otherwise receive a fatal electric shock.

An RCD provides a high level of personal protection. While RCD protection minimises the risk of serious electric shock, it **does not** eliminate that risk.

TYPES OF RCDs

There are three types of RCD.

1. Fixed at the switchboard

- > A switchboard RCD is the best option in most situations. It protects all the electrical wiring and appliances supplied from that circuit.
- > A licensed electrician or electrical inspector must install a switchboard RCD.

2. Built into the power point

- > A socket-outlet RCD is built into a standard power point to provide protection to equipment plugged into that power point and, if required, downstream protection of other power points.
- > A licensed electrician must install a socket-outlet RCD.

3. Portable

- > A portable RCD can be moved from power point to power point as needed. There are several different types of portable RCD:
 - Some plug directly into a power point. An appliance or extension lead then plugs into the portable RCD.
 - Some are built into extension leads or individual appliance leads.
 - Some are built into PSOAs (see Figure 3).
- > No electrician is needed - you can buy a portable RCD at a hardware shop or electrical equipment supplier.

Both portable and non-portable RCDs should be tested every day.

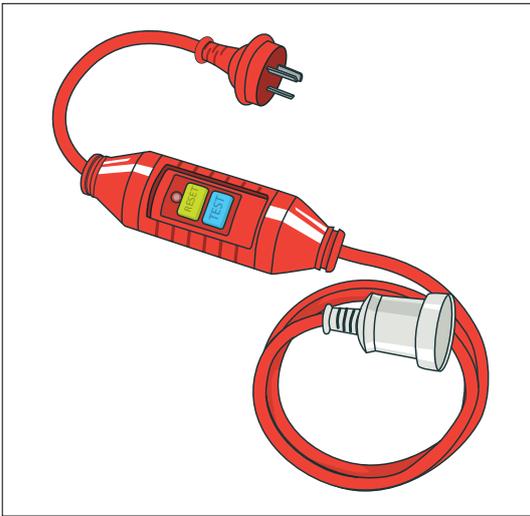


Figure 2: Portable RCD

PORTABLE SOCKET-OUTLET ASSEMBLIES (PSOAs)

A PSOA is a special type of multi-board that includes:

- > an RCD
- > an overload circuit breaker
- > one or more power points.

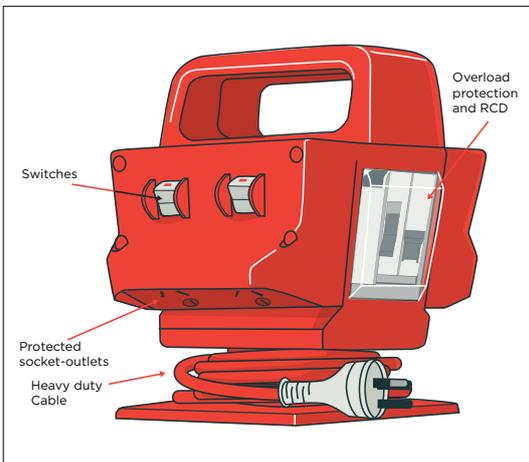


Figure 3: PSOA designed for harsh conditions

REQUIREMENTS

You do not need an electrician to install a PSOA – anyone can use one.

A PSOA must be marked as compliant with AS/NZS 3012 when you buy it.

The flexible cord feeding the PSOA must be:

- > the heavy-duty sheathed type
- > no longer than 2 metres.

TESTING

Every day, test the RCD on a PSOA (using the test button) before use.

Get PSOAs tested by an electrician regularly – at least every three months.

USE PSOAs COOPERATIVELY TO MANAGE RISKS

One good way for contractors to work co-operatively is by coordinating with each other about PSOA use on site. For example, PSOAs could be provided by a contractor to provide protection for their own equipment.

MULTI-BOARDS

Domestic multi-boards should never be used on a construction site.

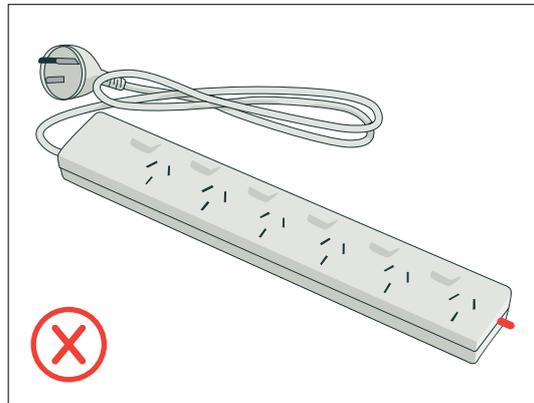


Figure 4: Domestic multi-board

Domestic multi-boards are only safe for low power loads, such as computers and printers. They have no protection to stop moisture or dust getting in. High power loads (such as circular saws and drills) can easily exceed the recommended current ratings.

LEADS, CORDS AND PLUGS

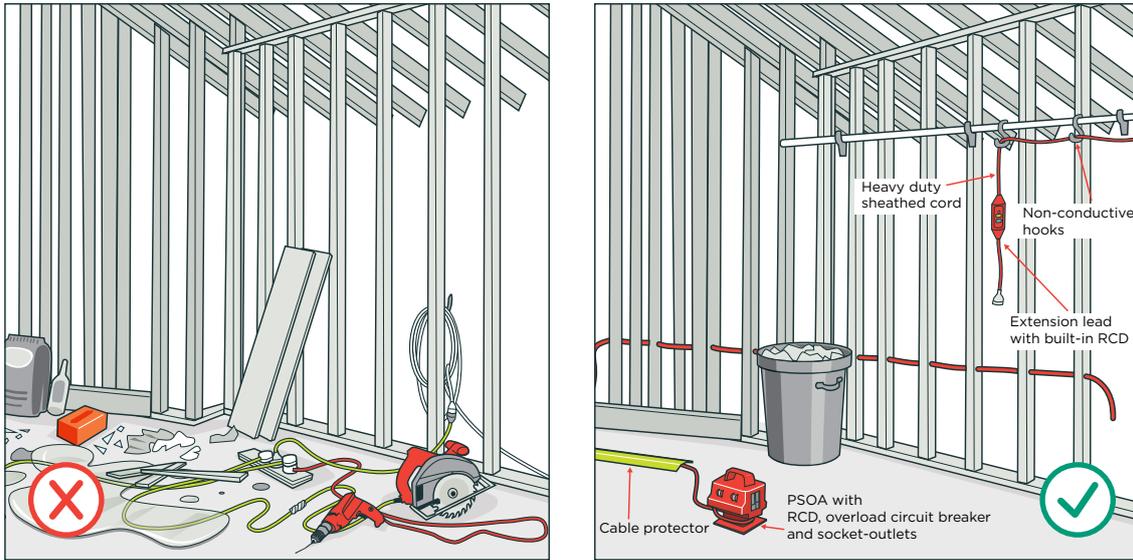


Figure 5: Arrange leads and cords to make sites safer

Leads and cords are easily damaged, particularly those connected to equipment which is often moved. Make sure leads and cords are suitably set up and protected:

- > Protect leads and cords from damage. Protection may include drop-over cable protectors, cord covers, non-conductive lead hooks and cable ramps. Damage can be caused by:
 - sharp edges and sharp objects
 - shoes, boots or other footwear
 - doors
 - moving vehicles and mobile plant
 - other mechanical forces
 - water, oil and other liquids
 - grease
 - heat.
- > Arrange leads and cords so that people won't trip on them.
- > Avoid running leads across aisles or passages.
- > Raise leads up rather than running them across the ground. Raised leads and plugs should be easy for workers to reach without a ladder.
- > Remove strain on plugs by using insulated supports.

EXTENSION LEADS

Extension leads are a temporary solution. You should not use them as a long-term or permanent electrical connection.

Flexible cords on extension leads must be the heavy-duty sheathed type.

Store extension leads away when you have finished with them.

Do not use an extension lead:

- > if the protection around the cord socket or the insulation is damaged
- > if you will exceed the manufacturer's current rating
- > with a piggy-back plug
- > that is coiled or rolled up - it could overheat.

PLUGS

Hard plastic plugs are easily damaged. Rubber or flexible plastic plugs and sockets are a better option.

Double adaptors and piggy-back plugs are not safe. They should **never** be used on a construction site.

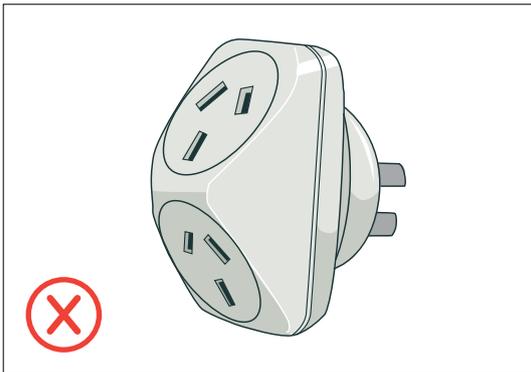


Figure 6: Double adaptor



Figure 7: Piggy-back plug

BATTERY-OPERATED EQUIPMENT

Using battery-operated equipment may minimise hazards associated with a mains electricity supply. These hazards include faulty leads, faulty RCDs and operation in wet conditions.

There is still a risk of electric shock from battery chargers that are plugged into the mains supply. Chargers are not weatherproof and they should only be used in a dry and dust-free environment.



CHECKING YOUR ELECTRICAL EQUIPMENT IS SAFE

At the start of every day, check whether there is any new electrical equipment on site and whether there are any new electrical safety risks to eliminate or minimise.

CHECK EQUIPMENT DAILY*

Damaged or faulty equipment may be unsafe. Many electrical risks can be controlled when you carry out these simple checks every day:

EVERY DAY

- ✓ Check that all electrical equipment is RCD-protected.
- ✓ Test RCDs using the test button, including RCDs on PSOAs.
- ✓ Look at the general condition of electrical equipment (including cords and leads) before use.
- ✓ Check for visible signs of damage or faults.
- ✓ Make sure that equipment operates the way it's supposed to (eg that the trigger switch on a drill responds to pressure).
- ✓ Check that suitable personal protective equipment (PPE) is being used, along with other controls.
- ✓ Check equipment is protected from weather and other environmental hazards (see Section 3).
- ✓ Make sure that leads and cords are arranged, used and stored safely (see Section 4).

Immediately disconnect and remove faulty or damaged equipment. This includes equipment that:

- > has given someone a shock
- > fails testing or inspection
- > repeatedly blows a fuse or trips a circuit breaker or RCD.

Clearly label or secure the equipment so that it will not be used. Then replace it or have it repaired by a licensed electrical worker.

* See the checklist in Section 6 for more information.

Indicators of unsafe equipment include:

- > cracked casings
- > missing or damaged guards
- > outer insulation pulled back at cable entry points so that wires are exposed
- > cuts and nicks along cables; tape covering cuts and nicks
- > dry and brittle insulation
- > burn marks or signs of overheating
- > RCDs not tripping when tested.

REPAIRS

Repairs need to be carried out by a qualified person, such as a licensed electrical worker.

Check that repaired equipment has the tag shown below:

REPAIR AGENCY ID _____
Repaired: Complies with AS/NZS 5762:2011
Job No. _____ Date _____

Figure 8: Repair tag

TESTING AND TAGGING

Testing and tagging is one way to check electrical safety and detect faults that may not be easy to see. But testing and tagging only confirms that equipment is safe at the time of testing. Even if equipment has been tested and tagged, it should still be RCD-protected and checked every day for visible signs of damage or faults.

WorkSafe recommends that you document results when electrical equipment is tested or inspected. Keep the test results on site.



ELECTRICAL SAFETY CHECKLIST

ELECTRICAL SAFETY CHECKLIST FOR SMALL CONSTRUCTION SITES

Who is this checklist for?

This checklist is a guide for a person who manages or controls a small construction site. It shows what you should consider when setting up and using electricity. It outlines what WorkSafe expects you to check every day, what should be checked when the site is first set up, and what should be checked regularly (and as needed).

The checklist is a guide to help you to identify where you may need to take action. It does not cover all legal requirements or all your workplace health and safety duties.

Site/location details

Site name and location:

Checklist completed by: (name, title, company)

Date: DD / MM / YEAR

Process for notifying WorkSafe about electric shocks

You must have a process for notifying WorkSafe if an electric shock exposes a worker or any other person to a serious risk to their health and safety, or if someone is seriously injured at work.

Everyone on site knows the process to follow after an electric shock or other notifiable event – and who is responsible for notifying WorkSafe.

CHECK THESE THINGS EVERY DAY

At the start of every day, check for new risks, new equipment, and any changes to the site layout. Everyone on site should know if anything has changed and what they need to do or be aware of (eg to eliminate or minimise new electrical safety risks). Give any new workers the information, training, instruction and supervision needed to use electricity and electrical equipment safely.

You and other PCBUs (eg other contractors) must, so far as is reasonably practicable, consult, cooperate and coordinate activities to manage electrical safety risks, as well as other health and safety risks. All workers on site must make sure that all electrical equipment provided or used is operated safely and PCBUs must make sure that all electrical equipment is maintained so that it remains safe.

RCDs

On a construction site, all appliances, light sources and other electrical equipment (including kettles and microwaves) should be supplied with electricity through an RCD that provides protection against electric shock.

All electrical equipment on site RCD-protected

All RCDs tested using test button, including RCDs on PSOsAs

OTHER ELECTRICAL EQUIPMENT

Electrical equipment (including cords and leads) checked for faults and visible signs of damage, such as:

- > cracked casings
- > missing or damaged guards
- > nicked cables; tape covering nicks or cuts
- > dry and brittle insulation
- > burn marks or signs of overheating
- > RCDs not tripping when tested

Faulty equipment immediately removed – then repaired and tagged by a licensed electrical worker, or replaced

ENVIRONMENTAL HAZARDS

Electrical equipment protected from weather

Electrical equipment protected from other harm (eg dust, water, chemicals, steam, UV rays)

Power tool users able to work under cover during rain

Battery chargers used in dry and dust-free environments

LEADS AND CORDS

Leads and cords arranged to prevent slips and trips

Leads raised up rather than run across the ground (eg hung on non-conductive hooks)

Cable protectors cover any leads that must run across ground

Workers can reach raised leads and plugs without a ladder

Extension leads have heavy-duty sheathed cords

Extension leads stored away when not in use

PPE

Suitable personal protective equipment (PPE) used, along with other controls

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New Zealand Government

SET-UP CHECKS

Check these things when you are first setting up your site. Continue to check them regularly while you are managing or controlling the site.

RISKS

Electrical safety risks on site identified

Electrical safety risks eliminated, or minimised (if elimination not practicable)

Hidden cables and lines to other utilities

Hidden electricity cables and other utility lines (such as gas pipes) located, identified and clearly marked

INDUCTION AND TRAINING PROCESS IN PLACE

Workers trained on electrical risks on site

Workers provided with information, training, instruction and supervision needed to:

- > use electricity safely
- > operate electrical equipment safely

GENERAL WORKPLACE FACILITIES

Site layout allows people to enter, exit and move about without risks to their health and safety

FIRST AID

Adequate first aid equipment is available

People on site have access to first aid facilities

People on site have access to trained first aiders (either on site, or at local medical centre or hospital)

There are CPR-trained worker(s) on site

EMERGENCY PLAN

Emergency plan prepared for worksite

People on site know what they have to do in an emergency

ELECTRICITY SUPPLY

If builder's temporary (temporary supply switchboard) on site

Installed/connected/modified/moved only by a licensed electrical worker

Has Certificate of Compliance (CoC), Record of Inspection (RoI), and Electrical Safety Certificate (ESC)

Assessed and issued Certificate of Verification (CoV) every six months

Close to where electrical work carried out

Easy for workers to reach

For refurbishment/renovation/domestic builds with switchboard for completed installation supplying electricity

EITHER equipment connected to one or more PSOs
OR enough fixed wire socket-outlets for all users through an auxiliary socket-outlet panel

REGULAR/ONGOING CHECKS

You may not need to check these things every day, but you should check them regularly.

PSOAs (Portable socket-outlet assemblies)

Contractors coordinate PSOA use on site

PSOAs marked as compliant with AS/NZS 3012 when purchased

PSOAs tested and tagged by electrician regularly (at least every three months)

EQUIPMENT TESTING

Schedule in place to alert you when electrical equipment due to be tested, checked, or re-certified

Results documented after electrical equipment is tested or inspected

Test and inspection results can be viewed on site (on paper, computer, or phone)

REPAIRS

Repaired equipment has proper tag

OTHER THINGS TO CHECK, IF THESE APPLY TO YOUR SITE

Hire equipment

Hire equipment has been tested and tagged by hire company before you hire it

If working close to overhead lines

EITHER electricity supply isolated

OR if isolation not practicable, another control in place

Minimum approach distances (MADs) identified
See Section 9 of WorkSafe's *New Zealand Electrical Code of Practice for Electrical Safe Distances* (ECP 34).

Compliance with minimum safe approach distance limits

Relocatable buildings and caravans

Connection to power has RCD-protection

Valid Electrical Warrant of Fitness (EWOFF) issued by electrical inspector

Connection to power has RCD-protection

Permanent supply leads:

EITHER raised on insulated supports

OR buried inside conduit in marked location

All repairs carried out by a qualified person (such as a licensed electrical worker)

For more information: www.worksafe.govt.nz

This checklist can be downloaded and printed from: www.worksafe.govt.nz

Some content in this checklist was adapted from the Health and Safety Executive publication *The absolutely essential health and safety toolkit for the smaller construction contractor* (2008) at: www.hse.gov.uk

ACKNOWLEDGEMENTS

Figure 5 was adapted from an illustration in an Accident Compensation Corporation (ACC) resource, with their permission.

DISCLAIMER

WorkSafe New Zealand has made every effort to ensure the information contained in this publication is reliable, but makes no guarantee of its completeness. WorkSafe may change the contents of this guide at any time without notice.

This document is a guideline only. It should not be used as a substitute for legislation or legal advice. WorkSafe is not responsible for the results of any action taken on the basis of information in this document, or for any errors or omissions.

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