

572: Demonstrate knowledge of electric fencing components and systems

Level
3



Learner Guide

Unit standard 572 v4	Level 3	Credits 5
Demonstrate knowledge of electric fencing components and systems.		

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Introduction

Learning outcome

To successfully complete this unit standard you will show that you have knowledge of electric fencing components and systems.

Notes

If you require the Learner Guide to be printed on coloured paper, contact Primary ITO on 0800 20 80 20 and talk to our Learning Support Team.

Glossary

You may find new words (highlighted in **bold black**) as you read through this Learner Guide. The meanings of these words are in the glossary at the back.

Symbols

You'll also see symbols which we've used to help you know what's going on, for example:



Alert: you must be aware of this.



Activity: a written activity for you to do.



Do this: a practical activity for you to do.



Search online: refer to online references for information on this topic.



Top tip: key information and useful tips.



Question: a question for you to think about.

Assessment

You will find a separate assessment booklet for this unit standard. You will need to work through the activities in the assessment.

Your Verifier will fill in the Verifier declaration once they are satisfied you have achieved the learning outcomes for the unit standard. Your Verifier may be your Supervisor or Workplace Trainer.

The Assessor will check all declarations and fill in the final sign-off once final competency is achieved. The Assessor may be your Training Adviser or a Workplace Assessor.

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Electric fencing

Unlike **conventional** fencing, electric fencing mostly works as a psychological (emotional) barrier to livestock. If livestock gets a shock from touching an electric fence, they quickly learn to stay away from the electric fences. Electric fences are also a physical barrier that stops livestock moving from one area to another.

Electric fencing is used for many reasons, but in general:

- it requires much less material to build than conventional fences
- construction/building is easier and faster, especially in difficult terrain
- fences can be easily and quickly moved if needed
- no special skills are required for building or using electric fences.

Components

This section looks at the different components (parts) you may use when building an electric fence.

Insulators

Insulators are an important feature in electric fences. They are used to contain electricity and stop wires **earthing**. There are many different insulators that can be used in different circumstances.

▶ End insulator

End insulators are used at the end of a fence line. They provide effective **termination** of the electric current on the wire from the **strainer**. They also allow the wire to be appropriately strained.

End insulators are made of plastic or ceramic.



▶ Fibreglass rods

Fibreglass rods are used when an electric fence is not permanent, as they are light and easy to move. Fencing wire can be attached using clips because the fibreglass rods themselves are insulating.



▶ Insultimber

Insultimber posts are often used when an electric fence is to be permanent. They are long-lasting and strong. Additional insulators are not required to attach the wires to the posts.



▶ Insultube

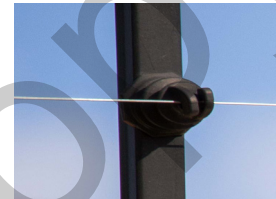
Insultube is made of plastic and is used to attach electric fencing to wooden posts while using conventional fencing staples. It insulates both the posts and the staples because the wire passes through the middle of the tube. It may also be used for running wires safely underground.



▶ Steel post insulators

Insulators that can be attached to steel posts providing a barrier between the electrified wire and the steel post.

They are usually made of plastic.



▶ Thread through insulators

Thread through insulators allow electric fencing to be attached to wooden or steel posts while making sure the wooden post does not conduct electricity. The wire is passed through the insulator which is then attached to the post.

They are usually made of plastic, but ceramic thread through insulators were common in the past.



▶ Wooden post insulators

Wooden post insulators provide a barrier between the electrified wire and the wooden post. They are used when the wire is to be fixed permanently to timber posts.

They are usually made of plastic, but ceramic insulators were common in the past. They are attached to the posts and then the wire is clipped into place.



Support posts

Support posts are as important in electric fencing as they are in conventional fencing. Let's take a look at what they can be made of and when you would use them.

▶ Concrete posts

Concrete posts are only ever used for permanent fencing. They are durable (long-lasting) and won't rot, decay or split, and are resistant to livestock and insects.

Insulators are needed to attach wires to posts.



▶ Fibreglass

Rods or pigtail standards are generally made out of fibreglass.

Pigtail standards are used for portable fencing that will be moved regularly. The wire is passed through the 'tail' at the top of the standard.

Fibreglass rods can be used for permanent or temporary fencing and are driven into the ground. Clips must be used to attach the wire to the rods.



▶ Hardwood and timber

Hardwood and timber posts are often used in permanent fencing situations. Often conventional fence posts are used, which requires insulators to be attached in order to attach wires to them.

Timber posts are often used when creating permanent divisional fences for large animals where grazing under wires is an advantage.

Timber is easy to transport and is easier to work with than concrete posts. They are usually the cheapest option for farm fencing.



► Plastic

Plastic posts are used for portable fences. Most have a range of lugs on them to fit wire into.

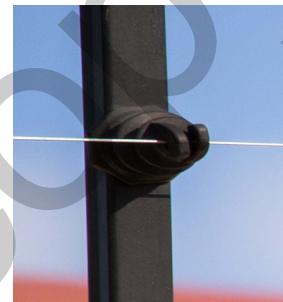
Newer plastic posts, made of recycled plastic, are replacing hardwood posts. These posts don't require insulators when attaching wires, are seated in the ground and are used for permanent fencing.



► Steel standards

Steel standards are used with all classes of livestock for permanent or temporary fencing. Insulators are required in order to attach wires. They are often used in flood-prone areas.

Steel pigtail posts are also available and are usually topped with plastic or rubber pigtails. These are used for temporary fencing.



Components

There are other important components in electric fences.



Have a look for images of the following components online.

You will find a wide range of different types of components.

► Cut-off switches

Cut-off switches provide an interruption point in the fence. This allows you to turn parts of the fence off and isolate (separate) them. This is important if you need to work on or move parts of the fence for example.

▶ Earthpegs

Earthpegs are part of an earthing system. They ensure that the electric current produced by an energizer can complete a full circuit. The pegs carry the current into the soil before it returns to the energizer. They are important to make sure livestock receive a sufficient shock to make the fence a psychological barrier.

▶ Energizers

Energizers store a charge and release it down the fence line as 'pulses'. They are electrical devices and usually run on batteries or mains power.

▶ Insulated droppers

Droppers are used on fences to maintain the wire spacing between posts. They prevent fence wires from spreading or sagging. They are also used to reduce the cost of fencing materials by reducing the number of posts required.

▶ Line clamps

Line clamps are used in a range of situations to maintain electrical connection across the fence system. They can be used to join two lengths of wire to continue a fence for example.

▶ Outriggers

Outriggers are single electric wires that are placed on conventional fences. These are used to stop livestock leaning on or over conventional fences.

▶ Under-gate cable

Under-gate cables carry the electric fence under a gate. This maintains the electrical connection across the fence system but allows the gate to be used without having to disconnect the fence each time.

Types of wire

Different types of wire are used in varied circumstances and to contain different types of livestock.

▶ Aluminium

Aluminium wire is more durable than other types of wire so is often used in corrosive or coastal environments. It can be used with all classes of livestock.



▶ 4 mm galvanised mild steel wire

Mild steel is used in situations where fence posts are closely spaced. This is often in very rough or uneven terrain.

It is also often used with equine fencing when lower livestock pressure is expected.



▶ High-tensile (HT) wire

High-tensile wire is most commonly used for permanent electric fences. It is suitable for use with all classes of livestock.



▶ Netting

Netting is most often used for temporary, short fences that need to be installed quickly. It is often used with free range poultry.

More permanent electrified netting may also be used to keep pests out of an area, especially rabbits and possums.



Energizers

Energizers are an electric box used for electrifying fences. They apply a large voltage (3,000–10,000 volts) for a short period of time. This is often called a ‘pulse’.

Types of energizers

In this section we’ll look at the different types of energizers that can be used to electrify fences.

▶ Battery units

Battery operated units are generally intended for temporary fencing and remote areas. Many of the units are portable (easily moved), which makes them ideal strip grazing when there is no mains power available.

Battery operated units are not reliant on mains power, so will continue to power a fence during a mains outage.

Batteries will eventually lose their charge so need to be regularly maintained. The life of the battery is directly related to its capacity and output power of the energizer. The rate of discharge can also vary widely with weather conditions, especially in very wet or very cold conditions.



▶ Mains units

Mains units are preferred for permanent fencing because they can generally power a greater length of fence (due to their greater power). They operate off AC power — the same as household appliances.

They will continually power a fence unless there is a mains outage. Mains units are not portable.

▶ Solar units

Solar units are made up of energizer and solar panels. As long as there is enough sun, the solar panels keep the batteries charged.

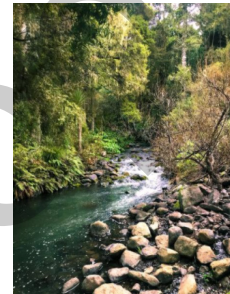
While solar units have a higher initial cost, they are ideal for powering very remote fences where no mains power is available.



▶ Water units

Water-powered units are made up of small water-driven generator attached to an energizer. As long as there is enough water flow, the generator keeps the batteries charged.

Water units are ideal for powering remote fences where no mains power is available, but a consistent water source (such as a small stream) is available.



▶ Wind units

Wind-powered units are made up of a small wind turbine attached to a generator and an energizer. As long as there is enough wind, the generator will keep the batteries charged.

Wind units are ideal for powering remote fences where no mains power is available, but where there is a consistent level of wind.



What energizer should be used when?

The location and the type of fence (permanent or temporary) will determine what type and size of energizer is needed to be used to power an electric fence.

The energy output of an energizer is measured in joules. It provides an indication of the ability to handle fence load (the length and number of wires in a fence), and leakage (when voltage is reduced on the fence because of something touching the wires).

In general, 1 joule of output energy will power 10 kilometres of single fence wire.

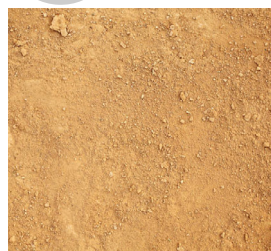
This means to power 15 km of 5 wire fence, an energizer will need an output of at least 7.5 joules.

You will also need to consider the following issues.

► Climate

The most important climates to be aware of with electric fencing are wet (creating a good earth) or dry (creating a poor earth) climates.

In dry climates, the joule rating of an energizer needs to be greater to compensate for the poor earth. The opposite applies in wet climates.



► Corrosion

Fences in coastal conditions are subject to **corrosion** from salt air or sea spray. This increases the resistance on the wire so a greater joule rating is needed.

Corrosive resistance may also result from two different types of metal coming in contact, causing accelerated (faster) corrosion or damage.



► Geography

Where the energizer unit is located in relation to the farm has a big effect on the size of the unit needed. Ideally, the energizer should be at the centre of the farm. If the energizer is at one end of the farm, the joule rating needs to be bigger as it is pushing the electrical current further, causing greater resistance.

► Livestock sensitivity

Different species of livestock 'feel' an electric shock in different ways. In general, wool, hair and feathers are not good conductors of electricity. For example, wool insulates sheep from electric shocks, so shorn sheep will conduct electricity better and feel more of a shock than a sheep yet to be shorn.

Most cattle are sensitive to shocks, but bulls are relatively insensitive. For this reason, the size of the shock needs to be greater to discourage bulls from putting pressure on the fence.

The size of the animals 'contact' with the ground, their feet, is a large factor in the size of the shock the animal will feel. The better the contact with the ground, the bigger the shock they have.

Earthing systems

Poor earthing systems are the most common cause of poor fence performance. For a fence to be effective, the **electrons** travelling from the energizer along the wire must be able to complete their circuit through the ground and back to the earth terminal on the energizer.

Positioning the earthing system

Large energizers require more power, and long fences will require more earthing. Soil itself is not a good conductor of electricity, so an earthing system must be installed in a site that has damp soil all year round.

An earthing system should be positioned a good distance from the energizer.

For drier conditions, more earthing rods or an alternative earthing system should be used. In ideal moist conditions, three earth pegs spaced three metres apart are suitable. All earth stakes should be connected by one single continuous wire attached by clamps.



Have a look for earthing systems online. You will find videos and useful instructions about how to install earthing systems and what to look for, depending on your environment and the size of the energizer you are using.

Glossary

Term	Definition
Conventional	What is generally done, for example, the usual type of fencing normally used in the area.
Earthing	<p>Is placing an earthing rod into the ground to create an electrical current circuit.</p> <p>For an electric current to shock, the electric current needs to complete a full circuit. This means an electric current moving from the fence energiser, along the fence wires, through the animal, into the soil and to a nearby earthing rod, and back to the energiser.</p> <p>If earthing rods are not used or not at the right distance apart, the circuit cannot be completed and the animal will not be shocked when it touches the fence.</p> <p>Earthing rods are usually made of galvanised steel pegs and are at least two metres long.</p>
Electrons	A very small particle that has a negative charge of electricity and travels around the nucleus of an atom.
Insulators	Are used with electric fences to contain electricity and stop wires earthing.
Strainer	Used to maintain tension on fence wires, prevent strain on posts, add strength and keep an electric fence looking good.
Corrosion	Damage caused to the wire.
Termination	The end of.

Resource Feedback

In order to keep our resources as up-to-date and relevant as possible we would appreciate any comments, feedback or suggestions you may have with regard to this particular resource or others that you have used.

Please contact us via email **product@primaryito.ac.nz** if you have any suggestions that you feel would be useful.

Please remember to indicate the resource you are giving feedback on in your email, and please provide your contact details.

Thank you for taking the time to provide us with feedback.

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