

# 37: Install fencing wire

Level  
**3**



Learner Guide

Unit standard 37 v5

Level 3

Credits 6

Install fencing wire

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# Introduction

## Learning outcome

To successfully complete this unit standard you will show that you are able to:

- select, run out, and set line wires
- pre-tension, tension, and terminate line wires
- staple line wires.

## Notes

- All evidence presented in this unit standard must be in accordance with:
  - Workplace and industry procedures
  - Health and Safety at Work Act 2015.

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.

# Selecting the right wire

This section looks at what you need to think about when choosing the correct wire for your fence.

## Why is selecting the right wire important?

Choosing the right wire for your fence is important.

- When you choose the right wire for the environment you are working in, your fence will last longer.
- When you choose the right wire for the livestock you are working with, your livestock won't be injured and they will be contained (kept) where you need them.

## The right wire for your environment

When you are planning your fence, you need to think about the environment your fence will be in. This will have an impact on the types of wire you choose to use.



Talk to your Supervisor about the fence you are planning and where it will be built. Check if there are certain things you should consider.

### ► Areas that flood

**What can happen:** fencing is easily damaged by flooding. **Debris** carried in the water sometimes cannot pass through and pushes against the fence. This can cause some fence posts to snap.

**What you can do:** if an area floods regularly, think about the breaking strain of wire and the type of wire to be used (e.g. high tensile or mild steel). Also think about placing fence lines **parallel** to the water flow of an area that floods, so debris runs along the side of the fence and not through it.





### ► Coastal areas

**What can happen:** fencing wire breaks down faster in coastal areas. Salt is very **corrosive**. This means when sea air, saltwater, and sand come into contact with fencing wires, it will start to 'eat away' at the steel and damage it.



**What you can do:** to protect steel from the environment it is coated with a protective layer of zinc – this process is called **galvanising**. You must choose galvanised wire when planning fences in coastal areas and check them regularly to look for corrosion.

### ► Areas with heavy snowfall

**What can happen:** in areas with heavy snowfall, snow can build up against a fence and put a lot of pressure on the wires and posts.



**What you can do:** think about the breaking strain of the wire and the type of wire to be used (e.g. high tensile or mild steel).

### ► Legal requirements

The law has an impact on the type of fences that can be built on a roadside. This includes the types of wire that can be used.

Roadside fences should be livestock proof. This will stop livestock from wandering onto the road and causing accidents. These fences should be post and batten fences with at least nine wires.

## The right wire for your type of livestock

When you are planning your fence, you need to consider the livestock you want to contain (keep in an area).

Take a look at the table below to see the types of wire that best suit different types of livestock.

Type of wire	Suitable for...
4 mm galvanised mild steel	<ul style="list-style-type: none"><li>• Sheep</li><li>• Lambs</li><li>• Horses</li><li>• Beef</li><li>• Dairy</li></ul>
2.5 mm galvanised high tensile (HT)	<ul style="list-style-type: none"><li>• Sheep</li><li>• Lambs</li><li>• Beef</li><li>• Dairy</li></ul>
<b>Fabricated</b> netting	<ul style="list-style-type: none"><li>• Dairy</li><li>• Deer</li><li>• Ostriches</li></ul>

## Types of fencing wire

Different types of fencing wire need to be used in different situations and to manage different types of livestock.

### ▶ 2.5 mm galvanised HT wire

This wire is **galvanised**, meaning it has the zinc protective coating to protect the wire from corrosion.

High-tensile wire is strong and less likely to stretch than mild steel wire. This means it snaps more easily if livestock push against it. While high tensile wire generally does not cause injury to livestock, if it is snapped and sharp ends stick out, this can harm animals.

High tensile wire is often used in **electric fencing**. It is also used for sheep and cattle fencing, as training wire, brace wire, and lead-out wire.



### ▶ 4 mm galvanised mild steel wire

Mild steel is also known as 'soft' or low tensile wire. It has a lower carbon content than high tensile wire. This makes it easier to stretch and bend into different shapes.

Mild steel wire is often used where fence posts are closely spaced. It is less likely to injure livestock, so is often used when building fences for sheep, cattle and horses.



### ► Barbed wire

Barbed wire is usually made of two galvanised wire strands wrapped together. Sharp pieces of wire are left sticking out every 100 mm or so.

Depending on the quality of the **galvanising**, barbed wire can rust at the barbs, shortening the life of the wire.

Barbed wire can injure and damage livestock easily. It can easily cut them or pull fleece away from the skin.

It is still sometimes used to discourage (put off) livestock from pushing their heads through a fence.



It is illegal to electrify barbed wire.

In some parts of the country it is also illegal to use barbed wire on a boundary fence, or on a fence that borders a road or public right of way.

Talk to your Supervisor to find out how barbed wire can be used in your area.

### ► Fabricated netting

**Fabricated** netting is made up of horizontal and vertical wires which are knotted together to create small squares. Netting can be made of either high tensile wire or mild steel wire. It also comes in a range of designs suitable for different types of livestock and environments.

Because of the way the netting is formed, it is low risk to livestock.

Netting can be used to keep different types of livestock in an area. It is most often used to help manage young animals, e.g. fawns and lambs, and other non-traditional animals, e.g. ostriches.

Talk to your Supervisor to find out how it is used in your workplace.





# Running out wire

This section looks at how to run out wire correctly, making sure you don't damage the wire, or injure yourself or others.

## Why is running wire out correctly important?

Knowing how to handle wire and wire coils the right way helps to:

- keep you and others safe
- protect the wire from damage
- make sure fencing jobs are better organised.

## Opening a wire coil

Before you open your coil, check for a tag and a **lead-end**.

If the coil is new, it will have a tag on it that tells you what kind of wire it is (e.g. high tensile, 4 mm). The **lead-end** usually passes through or is attached to, the tag.

If some of the coil has already been used, check carefully for a market or a bent-over end showing where the **lead-end** of the coil is. If there is no tag, take time to find the **lead-end** wire. You may need to trace the wire with your hand or a finger to check that the wire will easily uncoil once you have opened it.



### ► Opening a coil with a dispenser

A coil dispenser is a holder that protects the coil of wire, keeping it rolled tight while you are pulling out and using the wire. If you are using a dispenser:

- Place the coil on the dispenser with the **lead-end** facing upwards.
- Remove the ties from the coil.
- The coil is now ready for use.



### ▶ Opening the coil without a dispenser

If you are using wire and do not have a dispenser:

- Place the coil on the ground with the **lead-end** facing upwards.
- Remove the ties from the coil.
- The coil is now ready for use.

## Drawing wire out

Drawing out means pulling wire out from the coil. If you are working in a hilly area, start wiring at the highest point – it is easier to drag the wire downhill.

### ▶ Drawing out with a dispenser

- Walking along the fence line, pull the wire slowly and steadily out of the coil.
- Check that the wire is pulling freely from the coil and that there are no tangles.
- Try not to stop and start. When you **do** need to stop, push the end of the wire into the ground to keep it firmly in place.



### ▶ Drawing out without a dispenser

- Push the **lead-end** of the wire firmly into the ground to keep it firmly in place.
- Pick up the coil and walk steadily along the fence-line, pulling loops of wire from the coil one-by-one.
- Switch the sides of the coil you pull the wire from, to keep the wire from twisting or tangling.
- When you have finished drawing out the wire, dig the end into the ground to keep it firmly in place.



Check the wire regularly when you are drawing it out to make sure that it isn't tangling.

## Cutting wire

When you only need to use part of a coil, you will cut the wire to the length that you need.

Once you have drawn out the wire, follow these steps to cut the wire safely.

1. Make sure you are wearing safety glasses/ goggles and gloves. This will keep your eyes and hands safe if the wire snaps back suddenly.



2. Make sure both ends of the wire are fixed in place. Loose ends should be pushed into the ground to stop them from moving, or held safely by the dispenser.



3. You will need to use two hands to use many wire cutting tools.

If you are working on your own, put the wire on the ground. Find the spot you want to cut. Put your feet on each side of this cutting point. This will hold the wire safely in place while you cut.

If you are working with someone else, find the spot you want to cut. Ask your workmate to hold the wire on each side of the cutting point. Make sure your workmate is wearing safety glasses/ goggles and gloves



4. Always try to cut the wire the first time. 'Sawing' or stopping and starting will cut the wire in more than one place. These cuts will damage the wire.
5. When you have finished with coils of wire, bend the **lead-end** over and attach a tag to make it easy to find again. Make sure the coil is neat and tidy and re-tie it to keep the coil in place.



Some types of wire can safely be broken rather than cut. Check the tag and instructions on the coil for details.

# Spacing and stapling wire

This section looks at how you should position and space wires, as well as how you can make sure staples hold wires in place properly.

## Spacing wires

You need to make sure that wires are consistently spaced. This means regularly checking the measurements of the spacing to make sure they are the same along the fence. This will make sure the fence keeps livestock in the way you planned.

Use the same process each time for marking the spacing of wires on posts. Many rammers have spacing markers on their handle.



Talk to your Supervisor to find out what tools you can use to help you measure.

## Stapling

Rise and dip posts tell you the high and low points in a fence line. They hold the fence in line and check the upwards (sometimes called knock-up) or downwards (sometimes called knock-slack) pull of the wires.

Rise and dip posts should be stapled first. The rest of the posts in a fence can be stapled off after tensioning has happened.

### ► How to staple

Staple at 45° to the line of the wire.

Leave space so you can't quite fit a second wire through. This gives enough room for the wire to feed through when tensioning. It also stops wind 'chatter' or rattling.





For dips, drive the staples in at an upward angle.  
Two staples are best for holding.



For rises, drive the staples in at a downward angle.  
Two staples are best for holding.



On long strains, especially if two or three angles are included, leave one or two footed posts unstapled. These posts should be at the end, furthest away from where you want to strain. This helps make sure you will have an even tension along the entire line.



Avoid miss hitting when you are driving staples. If you hit the wire you can remove some of the zinc **galvanising** – this damage can cause the wire to rust faster.

#### ► Tidying

Make sure you remove any staples that are not needed or have dropped. Dropped staples can injure livestock. If a staple was not driven in properly and sticks out, it can damage the wire over time.

# Pre-tensioning wire

This section looks at how you can pre-tension wires before joining or terminating them.

## Pre-tensioning

Pre-tensioning is **tensioning** (tightening) wires before you have tied joining knots or joined wire in other ways.

A chain wire strainer is the most common way to pre-tension wires. The chain wire strainer's job is to tension wires and create a space where wires can be tied together. When the strainer is removed, you are left with the wires tied with a strong knot that will keep tension in the fence.

Once you are ready to pre-tension the wires, follow these steps:

1. Apply the chain wire strainers to the wire and draw them to the correct tension.



2. Check the wire and pull it through any staples that may have been driven in the wrong way or bent.
3. Tie and tidy your knots.
4. Slacken off the wire until the chain wire strainers are sagging and then remove them.



Make sure you know the breaking strain of the wire you are using.

As a general rule, wires should be strained to a quarter of the breaking strain of the wire.



# Joining wire

This section looks at the different methods you can use to join wires.

## When do we need to join wires?

At some stage in your fence, you need to join wires. This usually happens when a coil runs out and you need to start using another. You can join wires using joining knots, mechanical crimping, or in-line joiners.



Before you tie any knots, make sure the wire is pre-tensioned.

## Joining knots

What you use to join wire will largely depend on the kgf (kilograms of force) rating of the wire.

Knots can be used for wire up to 470 kgf, but mechanical joining methods should be used for high kgf ratings (see the next section).

Strong and durable joining knots are needed to make sure the two wires you are joining do not come apart.



A reef knot can be used to join wires up to 440 kgf.

A figure of eight knot can be used to join wires up to 470 kgf.

### ► Tying a reef knot

Follow these steps to create a reef knot:

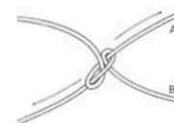
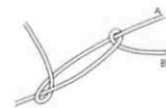
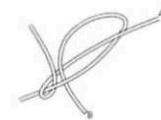
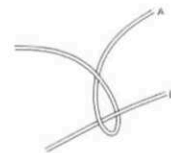
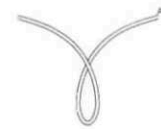
1. Create a loop at the end of wire A.
2. Pass wire B through the loop in wire A, bringing it up and under the base of the loop in wire A.
3. Pass the end of wire B back through the loop in wire A – creating a loop in wire B that interlocks with the loop in wire A.
4. Tighten the loops, pulling them together.



### ► Tying a figure of eight knot

Follow these steps to create a figure of eight knot:

1. Make a loop in wire A.
2. Thread wire B through the loop in wire A.
3. Position B under A and then bend back over A and under itself – creating a wide figure of eight.
4. Tighten the loop in wire B.
5. Pull the knot together



## ► Tidying

Whenever you are tying knots, including joining knots, you must wrap the ends and cut-off any wires that stick out. This keeps the fence tidy and makes sure that the wire ends do not injure people or livestock.



Tying joining knots will take some practice. Ask your Supervisor if they can help you practice your skills.

## Mechanical crimping

Crimps are metal 'sleeves' put on two wire ends. These are then squashed together with special crimping tools so that they bend and hold the wires tightly together.

Crimping is stronger than any knot. Crimps are put on when the wire is at the correct tension. Mechanical crimping is easy if you have the right tools.

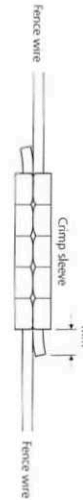


Before you start crimping, check that you have the correct crimp sleeves for the wire you are using.

## ► Crimping

Follow these steps to crimp:

1. Pre-tension the wires.
2. Slide the crimp sleeve onto the end of the fencing wire until 200 mm of wire is showing past the sleeve.
3. Push the wire to be joined through the opposite side of the crimp sleeve until 200 mm is showing past the sleeve.
4. Open the jaws of the crimping tool and place them over the end of the crimp sleeve.
5. Make sure the jaws overlap the end of the crimp sleeve slightly. The tool should also be at right angles to the crimp sleeve.
6. Push the handles of the crimping tool together and slide the jaws along the crimp sleeve. Use a smooth action to make sure there are no 'lumps' in the crimp sleeve.
7. When the sleeve is completely crimped, tidy the wire ends by wrapping them around the wires at least twice.
8. Cut off any wires that stick out.



## In-line joiners

In-line joiners are often also called **permanent strainers**. They stay in the fence all of the time and create a join that can be tensioned at any time using special tools.

- They are often used on short pieces of fencing (up to 30 metres).
- They cannot be used with barbed wire or aluminium wire fences.
- There are different types of in-line joiners and each works a little differently.



Make sure you ask your Supervisor to show you how to use your joiners safely.

In general, you will follow these steps:

1. Pre-tension the wires.
2. Attach one wire-end to the in-line joiner. This means wrapping the wire around a part of the joiner and attach it using a knot or slip the wire-end into a particular part of the joiner.
3. Attach the other end of the wire to the in-line joiner.
4. Use the specialist tool that comes with the joiner to tension the wires and join them.
5. Tidy any ends by wrapping them and cutting off any wires that stick out.





# Tensioning wire

This section looks at how to tension all of the wires on a fence.

## Tensioning


Before you tension the fence, make sure all the posts along the fence line are in place and any rise and dip posts have been stapled.

Tensioning the wires from top to bottom is recommended. This helps to make sure you get less sideways movement of posts.



Talk to your Supervisor about the order you need to tension the wires on your fence, because sometimes a different order is needed.

Once you are ready to tension the wires, follow these basic steps:

1. Apply the chain wire strainers to the top two wires and tension them to about half of the breaking strain of the wire. You may need to use a wire tension indicator. 
2. Pull the wire through any staples and close up any reef or figure of eight knots that have been tied.
3. Slacken off the top wire until the chain wire strainers are sagging. Re-tension so that the finished tied off wire is at the correct final tension.
4. Complete the process on the No.3 wire.
5. Complete the process on the No. 2 wire and work down the strainer post from top to bottom.
6. Staple off the rest of the wires.

# Terminating wire

This section looks at how **terminating** (ending) line wires.

## Termination knots

These knots are used at the end of the fence line to attach the wire to the strainer post. The wire is wrapped around the post before being tied off and tightened.

Follow these steps:

1. Loop the wire around the strainer post.
2. Bend end A around B and back over itself.
3. Tighten the loop in A.
4. Bend A back under B.
5. Rotate A around wire B.
6. Wrap A around B at least twice. Make sure each new loop follows the same line as the one before.
7. Cut any wire ends that stick out of the end of A.



Tying termination knots will take some practice. Ask your Supervisor if they can help you practice your skills.

# Glossary

Term	Definition
<b>Corrosive</b>	The 'eating away' or 'breaking down' of solid materials, e.g. steel rusting.
<b>Debris</b>	Loose materials and rubbish, e.g. broken branches, rocks, or thrown away rubbish
<b>Electric fencing</b>	A fence that has an electrical current that runs through it. They are used to shock a person or animal that touches the fence.
<b>Fabricated</b>	To make something by assembling parts or sections.
<b>Galvanising/ galvanised</b>	Coating iron or steel with a protective layer of zinc to stop rusting.
<b>Lead-end</b>	The end of a wire coil from which wire can be easily drawn.
<b>Parallel</b>	To be side by side with something, e.g. a fence that runs along the side of a river
<b>Permanent strainers</b>	These are permanent in-line joiners that stay in the fence.
<b>Protruding</b>	Sticking out or projecting.
<b>Tensioning</b>	This refers to tightening the wires on the fence.
<b>Terminating</b>	To end.

## 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](mailto: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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