



Introduction to Electric Fencing

Electric Fencing Systems Design, Installation & Maintenance



Introduction to Electric Fencing

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Why Use Electric Fencing?



Electric fencing is a reliable, cost effective way to control animal movement and manage pasture.

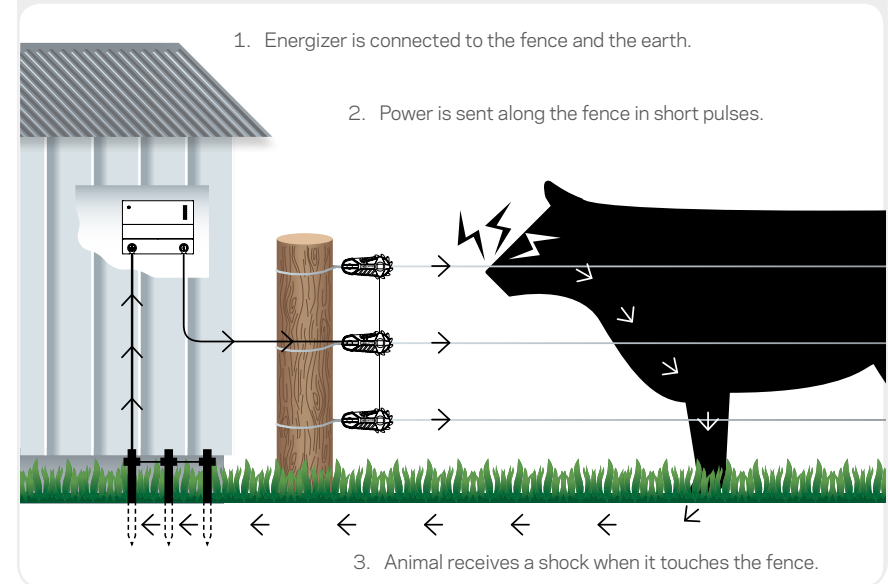
This includes:

- Keeping domestic animals in
- Keeping wild animals out
- Separating different groups of animals
- Rationing of crops and pastures
- Fencing off sensitive areas, trees, rivers and roads

Why Use Electric Fencing?

How Electric Fencing Works

An electric fence delivers a short, safe and memorable shock to create a psychological as well as a physical barrier.



At a basic level electric fencing is **more effective at containing domestic animal and livestock or excluding wildlife than traditional fencing** due to the fact that the short, safe and memorable shock creates a psychological as well as a physical barrier.

A pulsed electric current is sent along the fence wire, about one pulse per second, from an energizer which is earthed. When the animal touches the fence it completes the circuit between the fence and the earth receiving a short, sharp - but safe shock. The shock is memorable enough that the animal never forgets.

An electric fence is a psychological barrier, so it doesn't need great physical strength. However, it must be well designed and constructed to absorb some pressure from animals, snow and wind. The energizer must have enough power for the length of fence and for the animals being controlled.

Pasture Management and Rotational Grazing

Beyond just keeping animals in and out, electric fencing is the best way to achieve optimum pasture yield using rotational grazing methods. This approach works by keeping the grass fresh, short and palatable which ultimately leads to increased meat and milk production as well as reduced supplemental feed costs. It involves grazing paddocks in rotation using a combination of permanent and/or temporary fenced grazing areas.

KEY CONSIDERATIONS

Achieving optimum pasture growth is a delicate balance. When considering how best to meter out the pasture feed available look at the following:

1. Number & size of grazing areas - grazing specific areas, so other pasture sections are able to rest and re-grow.
2. How many animals to put on that grazing area - efficiently grazing the allocated area.
3. And for how long - graze to desired residual grass height

The combination of these factors determines the rotation length (how many days before the first area in the rotation is grazed again). The optimum rotation length varies significantly depending on the geographical location and time of year.

KEY BENEFITS

Effective

Maximise results potential of feed and greatly improve the feed quality and yield.

Efficient

Direct harvesting of grass or fodder crops by animal with the manure returned directly to the soil during the process.

Flexible

Use a combination of permanent & portable fencing to maximise grazing area control.

The more regular the shift (preferably daily or every few days) the more time the pasture spends growing rather than being grazed, leading to greater grass growth and stock carrying capacity.

Where a permanently fenced paddock is further subdivided using portable electric fences the stock are contained by both a front and a back fence. The back fence protects the recently-grazed area to allow it to recover so it can be grazed again sooner.

Subdivision with high stocking density ensures grass is harvested down evenly to the optimum residual length, and that over time manure is spread more evenly over the whole grazing area.



Why It Works

Maintaining grass at the high growth tillering stage ensures young, lush, green pasture with high protein and energy levels. Grazed and rested for the right amount of time creates the ideal conditions for grass growth when the plants produce leafy shoots from the base.

There are various grass varieties to suit different environments. Longer term options last 10 years or more and shorter term annuals can give extra yield over a shorter time-frame.

Forage crops (i.e. turnips, kale, sorghum etc.) are low cost to establish and can be used to fill feed deficits during cold and/or dry months where grass growth slows or stops altogether. Direct grazing of such crops using portable electric fencing eliminates harvesting and feeding out, with animal waste being returned directly to the land.

Managed Grazing Examples

If you farm sheep intensively, you may want as many as 100 paddocks. This means the sheep can be moved daily onto a fresh paddock using a three month rotation during slow or zero growth periods. When there are lambs and ewes during spring, two or more flocks can be grazed on a faster rotation.

For beef and dairy producers 30-50 paddocks are usually enough. Cattle are easy to strip graze with only one wire when longer rotations are necessary during slow growth periods.

Every electric fence system is made up of a:

- Power System
- Fencing System

Selection of these depends on property size, fencing usage and animal type.



Power System

1. Do you have a reliable electricity source?
 - Will determine Energizer type - mains or battery (including solar options)
2. How much fencing are you looking to power?
 - Distance / area influences Energizer size - and fence construction
3. What is your location?
 - Earthing is critical to good power transfer, drier areas need different fencing set-ups and more earthing to compensate
 - Solar energizer options are perfect for remote locations with good sunshine



Fence System

1. What do you want to achieve with your fencing?
 - Determines permanent and/or temporary subdivision
2. How long do you want it to last?
 - Some fencing systems are designed to last well over 10 years others while others are warranted under 10 years
3. What animals are you trying to keep in/out?
 - Influences the fence setup like the number of wires & spacing
 - Impacts the choice of wire ("conductor"). For example, horses have special requirements

Energizers

All Gallagher Energizers are low-impedance and guarantee a high-performance pulse. Selection is based on availability of mains power, fence length, number of wires, vegetation touching the fence, application (does it need to be regularly moved) and the number of animals (fence pressure).

The only true way to compare different Energizers is based on **STORED JOULES**, as this is a constant measure and not affected by variations in fence conditions or earthing.

Stored Joules - How it works

Like horsepower on a vehicle. It is the potential power in the engine to maintain speed no matter what the vehicle is pulling behind, or what the gradient of the road is.

In an Energizer, power from either a mains outlet or battery source enters the unit and is stored in capacitors. This stored energy is the potential energy available in the single pulse per second generated to power the fence line. The higher the stored joule rating the greater the Energizer's ability to push past shorts caused by weeds and fence faults, as well as cover future fence expansion.

Gallagher Recommends Always purchase an Energizer with more power than you require. More power provides more confidence that the fence will perform despite unexpected shorts like vegetation growth. Also electric fence systems tend to grow, so purchase an Energizer with headroom to power additional future fence.

TERMS

Voltage - a measure of electrical "pressure" that drives current flow

Current (amps) - a measure of the flow of electrical energy

Stored Joules - the amount of energy stored in the energizer available for each pulse

Output Joules - the energy discharged on the fence

Pulse Shape - the measure of the wave of energy traveling down the fence line

Gallagher's range of Energizers continues a proud tradition of the world's best engineered products

1) Indicator lights on all Energizers tell you at a glance that the Energizer is operating

2) All Energizers are fitted with lightning protection and are fully modular for rapid servicing and replacement

3) Gallagher's reputation for worldwide service and satisfaction has endured for over 80 years

4) All Energizers purchased after January 1, 2018 carry a three year warranty.

Types of Energizers

Mains Energizers are the best choice if you have access to a power outlet. The Energizers are reliable in every situation with the exception of a power outage and will provide you with the most power for the least amount of money. You will need to install them inside a structure where they are protected from moisture.



Battery Energizers are typically portable and great for remote areas far from power outlets, especially in cases where they are likely to be periodically moved. These are powered by a 12v rechargeable battery, "D" cell batteries or a 9 volt disposable dry cell battery.



Solar Energizers are used in portable and permanent situations and an excellent choice for temporary fence applications. They are a logical choice for remote areas where there is no mains power.



The solar panel charges the battery by converting light directly into electricity. The battery stores this electricity to operate the energizer. This enables the energizer to operate at night or during periods of low sunlight.

Multi Powered Energizers combined with various adaptors will allow you to power your Energizer using any one of the methods listed above: Mains, Battery or Solar. This is a great choice if you move your fence to locations where mains power exists in one location but not the other.



	MODEL	STORED ENERGY (Joules)	PROPERTY SIZE (Ha/Ac)	SINGLE WIRE DISTANCE Maximum Length (Km)	MULTIWIRE DISTANCE Light Conditions (Km)	MULTIWIRE DISTANCE Typical Conditions (Km)	OUTPUT ENERGY (Joules)
Mains Powered	M10,000i	100	400/1000	600	200	50	71
	M5800i	58	240/600	420	140	35	40
Multi Powered	MBS2800i	28	120/300	240	80	20	15.5
	MBS1800i	18	75/190	195	65	17	12.4
	MBS1000i	10	40/100	135	45	11	7.7
	MBS800	8	32/80	105	40	10	6
	MBS400	4	16/40	75	30	8	3
	MBS200	2	8/20	42	20	5	1.5
	MBS100	1	4/10	30	10	3	0.97
Integrated Solar	S400	4	16/40	90	30	7.5	3.1
	S200	2	8/20	60	20	5	1.5
	S100	1.0	4/10	30	10	3	0.74
	S40	0.4	2/5	15	5	1.5	0.29
	S20	0.2	1.2/3	6	2	1	0.16
	S10	0.1	0.5/1.3	3	1	0.3	0.08
	Battery	B300	2.6	15/40	90	30	8
B200		1.45	10/25	60	20	5	1.1
B40		0.38	2/5	18	6	1.5	0.28
B11		0.11	0.5/1.3	3	1	0.3	0.09

Gallagher Recommends – comparing energizers by stored joules. This number is a constant and not affected by conditions that affect output joule performance such as number of wires and vegetation growth. Distance and area ratings are based on manufacturers estimates.

* Please note, the selection of energizers for your country may differ from those listed above

Gallagher i Series Fence Energizer Systems

i Series Energizers are designed for permanent fencing applications and have extremely reliable power that adapts output up or down depending on your fence conditions. Each one also comes with a separate controller that can be mounted outdoors for easy fence performance checks.

ENERGIZER

Reliable and adaptive performance even in extreme conditions



ENERGIZER CONTROLLER

Easily monitor and control fence performance



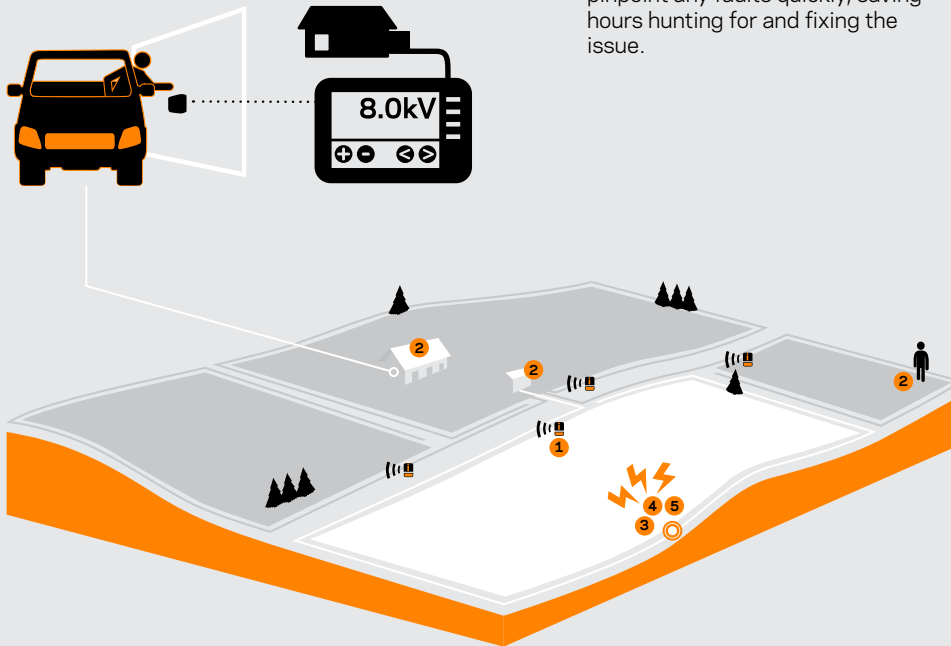
FENCE MONITOR

Create fence zones and monitor fence performance around your property



ENERGIZER REMOTE & FAULT FINDER

Quickly locate and repair faults



On i Series models you can also add monitors around the fence line that feed information back to the Controller and tell you if all is well or if there is a fault in their area.

The Remote & Fault Finder helps pinpoint any faults quickly, saving hours hunting for and fixing the issue.

ALARM SYSTEM

Secure your assets

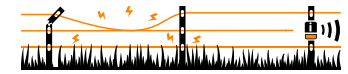


WIFI GATEWAY

Send fence performance information and alarms directly to your mobile phone.



How the System Works:



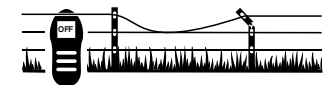
- 1 Fence Monitor(s) recognize any significant drop in fence zone or Energizer performance and raise alarms.



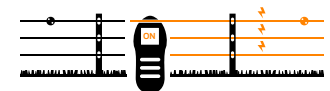
- 2 Alerts are sent to the Energizer Controller, your mobile phone and/or optional Alarm System.



- 3 The Controller and Remote indicates which zone is in fault. The Remote is used to find the fault within the zone.



- 4 Power to the fence at the fault location is turned off using the Remote, allowing a safe and convenient repair.



- 5 Once the fault is repaired, power is restored to the fence and tested using the Remote.

Earthing Systems

The energizers earthing system must be as conductive as possible for the fence to give the animal an effective shock. A simple guide is one earth stake for every five joules of stored energy with a minimum of three earth stakes.

Follow the recommendation in the chart to get the maximum benefit. When in doubt, add more earth stakes. The number of earth stakes will vary depending on the power of the energizer and the soil type. High powered energizers need more earth stakes than low powered energizers. Dry, sandy, rocky or frozen soil will require more earth stakes than wet soils.

Energizer Size	Earth Stakes
Up to 15 Joules	3 Stakes minimum
Up to 25 Joules	5 Stakes minimum
Up to 35 Joules	7 Stakes minimum

Handy Hint

The 4-3-2-1rule for earth stakes when installing permanent fencing

- 4 metres between earth stakes
- 3 earth stakes minimum*
- 2 metres minimum length of earth stakes
- 1 wire connecting all earth stakes to Energizer earth terminal

*As a rule of thumb, use at least 3 earth stakes or the Energizer Stored Joules rating divided by 5.

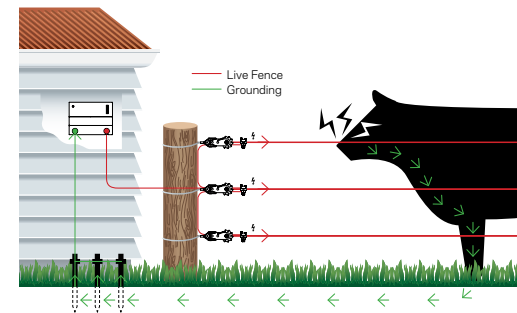
Why does the Energizer need an earth system?

The earth system is half the circuit of your fencing system. Electrons travel from the energizer, along the fence wires and back through the earth to the Energizer to complete the circuit. Like a radio antenna collects sound waves, the earth system collects the electrons. The earth system must be as conductive as possible for the fence to give the animal an effective shock.

Main causes of a poor earth system are:

- Rusty or corroded earth stakes
- Broken earth wire connecting the stakes
- Not enough earth stakes
- Earth stakes too close together or too short
- Poor connections at the stake or in the connecting wire

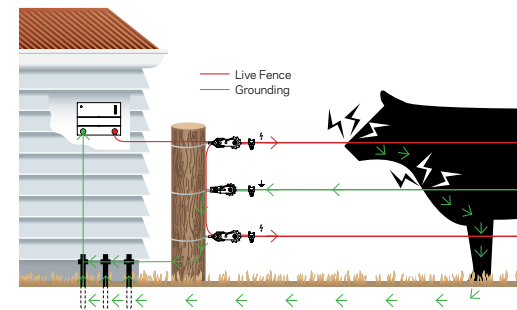
Additionally you will need to set up your electric fence according to how 'green' the area is all year round.



All Live Wire System

- Best suited for wetter regions

For use in greener regions with good earth conductivity. All fence wires connect to the red terminal on the Energizer and a shock is delivered to an animal when it's touching the ground and the fence at the same time.



Earth Return Wire System

- Best suited for drier regions

For use where the ground struggles to conduct enough power (for year-round dry, frozen or snow conditions). The live and earth wires on the fence create the shock when the animal touches them both at the same time.

Don't	Do
Allow bare wires to touch an iron clad building - use double insulated cable	Keep energizer earth system at least 10m (33ft) away from other electrical earth connections
Do not use rebar steel for earth stakes	Keep energizer earth system at least 10m (33ft) away from any metal pipes carrying water
Do not use copper lead-out wire or copper earth stakes.	Use galvanized earth stakes. Rusty or corroded earth stakes will not be effective
Place near fertilizer, animal urine and manure (corrosion)	Locate Stakes where soil tends to stay moist, north sides of buildings (southern hemisphere) and low spots
Place your earth stakes where they are likely to be hit by equipment	Use high conductive cable for connecting the Energizer to the fence's earth system
	When constructing positive/negative fences, re-earth negative wires every 500m by installing an earth stake at that location

Using a Fault Finder

The current flow on the fence will vary depending on the size of your Energizer, amount of vegetation and the size of your fence system. With time you will learn the normal current flow on your fence.

Fence tools and testers are another useful accessory to have on hand when building, maintaining or checking an electric fence. Gallagher has two fence testers, both available from your local Gallagher Dealer. The Fault Finder is an all-in one device, current meter and fault finder. The Volt Meter measures volts only.

To obtain the best results from your Fault Finder, Gallagher recommends that you check the current while the fence is operating without any faults. Then, when you suspect there is a fault on the fence line, you can compare the current flow with the "normal" current flow.

This will indicate whether a fault exists and, if so, how much the fault is affecting the performance of the fence.

HANDY HINT:

Multi-wire fences connected in parallel will have similar current flowing in each wire. To get the total fence current flow, add together the current flow in each wire.

Fence Volt/Current Meter and Fault Finder
G50905



Fence Volt Meter
G503014



1. The Arrow on the LCD will indicate which direction the current is flowing.
 2. Following the direction of the current, take readings approx. every 100m or at junction points along your fence line.
- Note: At a junction point, follow the wire with the highest current flow.
3. A fault is indicated by a drop in current flow between two checkpoints. The fault will be somewhere between the two checkpoints.
 4. To narrow down the location of the fault, work back along the fence checking the current flow at shorter intervals.
 5. Correct the fault.
 6. After correcting the fault you should see the current reading drop and the voltage increase. If not, check for further faults.

See page 42 for more troubleshooting help using a Fault Finder.

Testing an All Live Wire Earth System

This should be done once a short section of fence has been built. You should test your system at least once a year at the height of any dry period to ensure the Earthing capacity is sufficient for the joule rating of the energizer.

Short the fence out at least 100m away from the earth system by using several earth stakes between the wires and the ground. Reduce the fence voltage at this point to 2000V (2kV) or less.

Using a Volt Meter, measure the voltage between the wire connecting through the earth stakes to the Energizer earth terminal and an independent earth stake. This stake should be a galvanized metal stake, minimum 0.3m long (this stake is only used for measurement so does not need to be very long). Place the stake 1m away from the earth stakes or as far away as your Volt Meter cable will reach.



There should be no reading on the Volt Meter; however, up to 200V (0.2kV) is acceptable. If the voltage is higher than this, switch off the Energizer, drive in more earth stakes at the recommended spacings and connect them to the existing earth system until the voltage is down to the acceptable level.

Testing a Earth Return Wire System

Install a 2m earth stake as close as possible to the end of the fence. Install a 500 ohm load tester between a live wire and earth wire. Choose the location for the earth stake in a damp area if possible. If you cannot find a damp area, the earth test may be unreliable.

Using a Volt Meter, measure the voltage between the live wire and the earth wire across the load tester you just installed.

Next measure the voltage between the live wire and the independent earth stake, leaving the load tester in place.

If the second voltage reading exceeds the first by more than 1000V (1kV) check the earth return wire for loose connections.

Extra earth stakes can be added at various places around the fencing system and connected to the earth return wire to improve earth performance.

Finally, connect the independent earth stake to the earth return wire as a permanent connection.

Note if the first voltage reading is less than 3kV, your fence system is at risk of poor animal control.

Assuming that your earth wire return system checked out satisfactorily, check that the fence live wire has good connections. If connections are good, it is possible that your energizer is too small for your fence system. Assess your total length of fence or property size against the energizer selection chart on page 11.

Lightning Diverters

Lightning will likely damage your Energizer if it strikes your electric fence. Gallagher Energizers have internal lightning diverters that give partial protection against small strikes.

Since lightning always finds the easiest way to ground, installing a Lightning Diverter will give added protection by providing a path for any lightning that strikes the fence to be diverted to the ground.

Otherwise disconnect the Energizer from the fence and power supply during lightning storms.

Using the diverter does not guarantee complete protection. In bad lightning areas, Grounding the top fence wire helps significantly by encouraging the lightning get to ground without passing to the Energizer.

Leadout

Leadout describes the cable and wire that carries the power from the Energizer to the middle of your fence system. It can be either run overhead or underground. Insulated leadout cable should be used to prevent the leadout from shorting out on obstructions or the ground and should be used in buildings, under gateways and where soil could corrode exposed galvanized wire.

Standard cable using 2.6 or 1.6mm wire should not be used for long leadouts or for long distances underground, because these products will cause resistance to the flow of current reducing the available voltage in the fence.

This is not so important on small properties, but where medium sized distances of fencing are to be erected (1km), use 21 gauge (2.5mm) leadout cable. On large properties with energizers larger than 20 joules, high conductive cable should be used.

Never use household electrical cable; it is made for a maximum of 440 volts and for inside work only.

Never use copper wire undergate cable because electrolysis problems occur where it is joined to galvanized fencing wire.

Keep resistance to a minimum and ensure maximum power transfer around your property by choosing the cable with the lowest ohm's rating.

CAUTION

NEVER use household electrical cable. It is made for low voltage use only.

NEVER use copper wire/cable because electrolysis (electrical corrosion) occurs where it joins galvanized wire.

Selection of the right fencing systems depends on property size, fencing usage and animal type. Use this electric fence guide to help you configure your fence based on your usage and the animal(s) you will be fencing.

1 Permanent Electric Fencing

Permanent electric fences for highly effective animal control that lasts a lifetime.

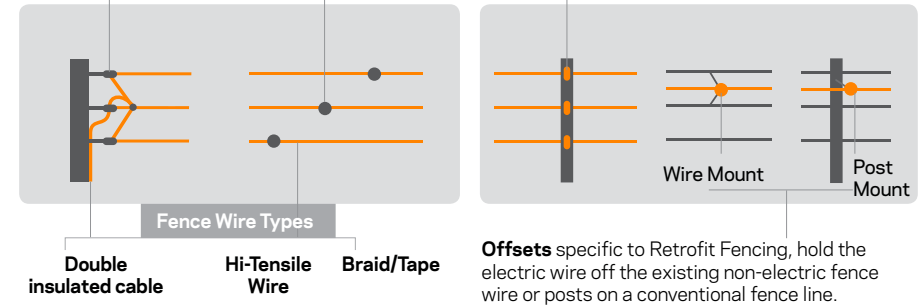
2 Offset Fencing

Extend the life of an existing conventional non-electric fence by retrofitting an offset wire.

End strain assembly provides an insulated attachment between the wire and the strainer posts at each end of the fence.

In line straining allows the fence to be tensioned and re-tensioned as required.

Insulators attach the fence wire to the posts, keeping the wires at the correct spacing and height.



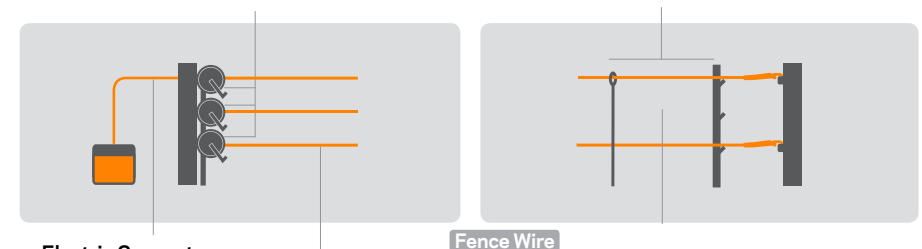
Offsets specific to Retrofit Fencing, hold the electric wire off the existing non-electric fence wire or posts on a conventional fence line.

3 Temporary/Portable Fencing

Easy to transport, assemble and take down for short-term animal control or rotational grazing.

Reels hold the tape, braid or wire for the portable fence. You can use just one or more reels for single line fences or up to three reels, attached to a reel stand, for multi-wire fences.

Posts are lightweight yet sturdy. Pigtail and Ring Top posts are most popular for cattle fences and multi-wire treadins are used for all livestock fences.



Electric Connectors are leads that connect a portable fence to an existing permanent electric fence.

Tapes, Wires and Braids are used on portable fences rather than the high tensile galvanized wire used on permanent fences. Gallagher conductors are ideal for portable electric fences as they are light, visible, easy to wind and durable.



1. Permanent Fencing

High tensile wire systems create long life, permanent electric fences. They are easy to install and provide highly effective animal control that lasts.

Permanent fences use highly conductive, corrosion resistant fence wire together with wood, steel, fibreglass or Gallagher Insulated

Line Posts, coupled with components to keep fences looking good and working effectively for a life time.

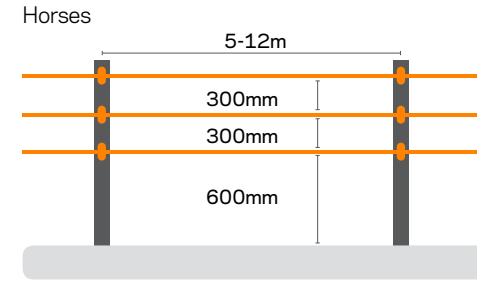
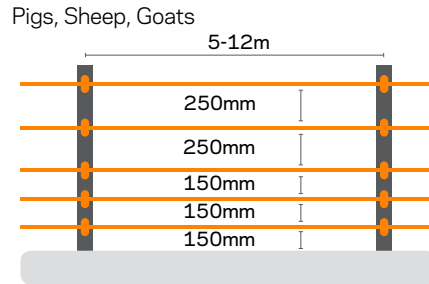
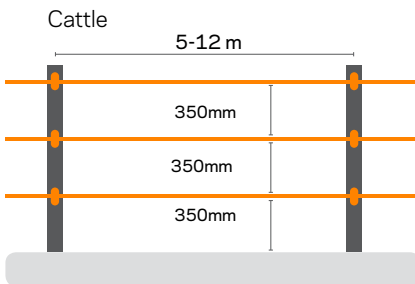


Horses are lively and at times unpredictable, so keeping them safely contained is paramount.

A Gallagher equine fence is a safe, reliable and highly visible solution designed to ensure your horses' welfare.

Three options are commonly used for long term equine electric fencing - a permanent fence using the new Equine Fence Wire, semi-permanent Tape or Braid fences.

Fence Set Ups



High quality, long lasting electric fences cost less than other traditional fencing options.



Gallagher's Insulated Line Post makes fence construction easy giving a low maintenance and attractive fence.



Animals quickly learn to respect electric fences and keep away - so the fence looks good for longer, and your investment is protected.



Equine Fence Wire is the safest, most effective electric fence for your horse. This long life, high tension fence uses specially designed wire coating to reduce risk of injury.



Turbo Braid can be used as a low tension semi-permanent fence alternative to Equine Fence Wire. Braid is designed not to tangle or overstretch and is easy to install.



A semi-permanent Tape fence is highly visible, simple to construct and will last years, making this type of fence an economical and popular choice for horse owners.

Choosing Permanent Fence Posts

While the heart of your electric fence is your energizer, fence posts are the backbone of your fence system.

A permanent fence post needs to stand straight and solid for many years. Permanent fence line posts typically have about one third of their length underground, so add half as much again to the height of your fence to determine the post length. End and corner posts typically have as much in the ground as above.

There are four types of permanent fence posts: wood, steel, fiberglass and Gallagher Insulated Line Posts.

Wood Posts

Round wood posts provide the basis for a strong permanent electric fence. Gallagher offers a range of insulators for attaching electric fence wires to wood posts, including special equine fencing products for Equine Fence Wire, braid and tape. Insulators can be attached to the post using staples, screws or flat head nails.

Posts can be installed by digging a hole and then manually backfilling and tamping the post tight, or by driving the post into the ground using a tractor or trailer mounted post driving machine.

Post spacing depends on the number of wires, wire type and terrain and can vary between 4 - 12m. Post spacing can be extended if fiberglass posts or droppers are installed between the posts.

Steel Posts

A steel post offers a simple line post alternative to a wood post. Steel posts have the advantage of being able to

be installed using a sledge hammer or manual post driver, reducing the need for expensive post hole diggers or tractor mounted drivers. They can also easily be driven into harder ground. Gallagher provides steel post insulators that can snap-on to a steel post and hold a fence wire.

Additionally, fence toppers are available for securing a top mounted tape or wire. Post spacing is the same as for wood posts.

Fiberglass Posts

Fiberglass is a quick and easy option for permanent fences.

Posts are simply driven into the ground using a post driver. Post clips allow for wires to be attached.

Gallagher Insulated Line Posts

Gallagher now offers an Insulated Line Post. This post is an insulated fiberglass post protected by a UV resistant polyethylene sheath. It gives the post the ability to flex when the fence is impacted, preventing broken or bent posts, and minimizing animal injury.

The Insulated Line Post uses a nylon "snap-on" clip to hold wire to the post. A tape clip is also available.

The insulated line post includes a specially shaped foot profile that provides exceptionally good ground holding. The post is driven into the ground using a hand held driver, providing a long lasting, safe and economical permanent fencing solution.

Permanent Fence Tools

Below are some useful tools that will be referred to as you continue reading.

Fencing Pliers & Wire Cutter G52200



Specifically designed for cutting, stripping and bending electric fence wire with minimum wire damage.

Strainer Handle G69530



Spring loaded ratchet strainer handle for quick adjustment of wire strainers (fits most varieties of ratchet strainers).

Ratchet Wire Tightening Tool G64500



In line wire tightener handle with super smooth ratchet action, to be used with Gallagher in-line wire strainers (G64300).

Wire Twisting Tool G52300



Ideal for installing clips on posts and droppers.

Spinning Jenny A309



A necessity for building permanent fence. The adjustable break keeps wire from over-spooling.

Post Driver G52501



A specially designed driver for the Insulated Line Post.

Tie Down & Handle G61500 Tie Down G61501 Handle



For use in hollows. Ensures a secure fence tie down. Tie down and handle sold separately

TERMS

Insulator - a non-conductive, insulating device used to secure the fence wire to the fence post, providing electrical insulation preventing power loss.

Clips - Like an insulator, clips attach a wire to a post. Clips can be metal or plastic.

Angle Stay - Used to stay or "brace" a corner or end post in multi-wire systems.

Corner - Where a straight run of fence meets another straight run of fence from a different direction. Right angle corners are easily stayed for stability.

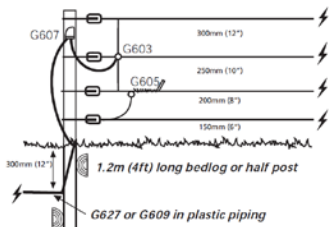
Tie-downs - Are anchors to hold wire down in hollows.

Droppers (Stays) - maintain wire spacing between posts on multi-wire high-tensile electric fencing. Droppers sole purpose is to maintain vertical wire spacings between posts.

Constructing permanent electric fences involves several steps:

1. Installing end & corner posts
2. Attaching strain insulators to end posts
3. Installing guide wires and line posts
4. Tensioning the wires
5. Completing the electrical connections
6. Installing gates and gateways

Gallagher also recommends using fence management tools to make fault finding and repair quick and easy



Bedlog

A bedlog is best suited for up to 4 wire fences in firm ground with low to medium tension fences.

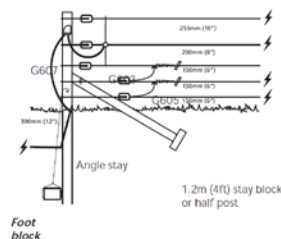
CAUTION: Bedlogs should not be used in soft or swampy ground

Angle Stay

Use an angle stay for 5 wire fences in firm ground. The stay hole in the strainer post should be just less than halfway up the post from ground level for the correct angle.

On the back of the post, attach a foot block to prevent the post rotating up and out of the ground. Select a second post to use as your angle stay - make sure it is at least 2.1m (7ft) long.

Dig a suitable stay-block into firm ground, at least 100mm (4") below the surface. The position of the stay-block should ensure that the stay fits tightly into the hole in the strainer post and is in line with the fence.

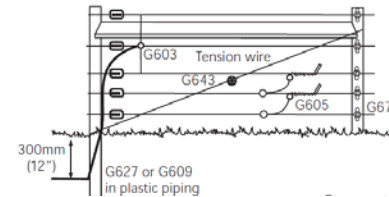


H Brace / Horizontal Stay

An H brace assembly is best suited to soft ground, providing the best fence anchoring system of those shown here. Install an additional post approximately 2.5x height of the fence away from the end post and in line with the fence wires. Notch a horizontal post into the top of each vertical post.

Hold in place with a tension wire strained using a G643 wire tightener

Gate openings need consideration as well. Posts may need to be of larger diameter and set deeper depending on the length and weight of the gate that will hang from it.



1. Installing End & Corner Posts

End Strain System

When fence wires are put under tension they will pull on the end strain posts. End strain assembly choice depends on the number of wires on the fence, the ground type and access to installation equipment. Using a tractor and post rammer in firm ground is usually sufficient without any of the following options. Otherwise an effective end strain assembly using a bedlog, angle stay or H brace is necessary to ensure the fence stays in good shape.

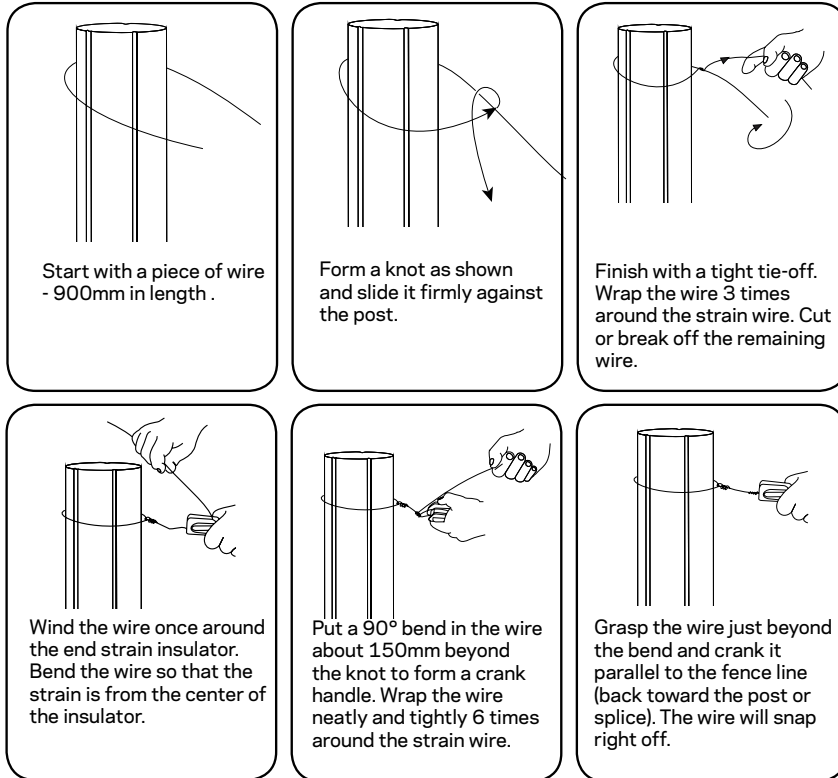
End Strain Post Installation

Plan the fence line and set both end and any corner posts in position. A 2.1m (7ft) post, 150mm (6") in diameter is usually strong enough for both end and corner post applications (if you are planning to hang a heavy gate from the post, ensure the post is strong enough.)



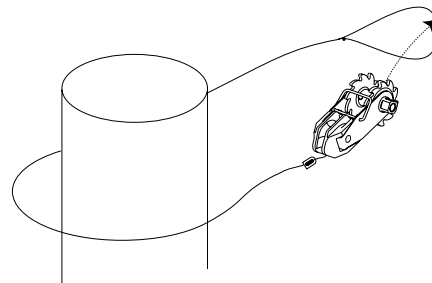
2. Attach Strain Insulators to End Posts

Mark the wire spacings on the end posts. Tie the end strain insulators no more than 100mm away from the post to prevent animals from pushing through the fence between the post and insulators.



HANDY HINT

To save time and effort, purchase a Gallagher Termination Kit. This kit includes pre-assembled insulated wire strainer and wire loops for your end posts, eliminating the need for special tools or wire tying.



3. Install Guide Wires & Line Posts

Use a spinning Jenny to run out the top and bottom wires as guides for positioning line posts. Use 12.5 gauge high tensile wire for electric fencing because it retains its tension far longer than soft wire. It is reasonably easy to use and conducts enough current for most situations when connected in parallel.



Tie off the top and bottom wires to the end strain insulators and any angle or corner insulators. Leave the tails long enough so they can be used for electrical connections later (see diagram on page 29). Next, tension the wires just enough to provide a straight line for positioning the line posts (see 4. on page 29).

Install line posts on rises or hollows first. As each post is installed, attach the wires to them to help decide the position of the next post in the fence line. On sharp rises, line posts may need a block to prevent the post from sinking while posts in hollows may need to be tied down. Fibreglass posts should only be used in straight lines.

Install the remaining line posts where necessary. On flat or level ground use one post up to every 12m. On hilly or uneven ground, posts will need to be closer together to maintain the wire height.

Run out the remaining wires, tie them off to the end strain insulators and attach them to all the posts using insulators.



Choosing the right insulator for your fence

Gallagher's heavy duty plastic insulators are made from the highest quality polymers infused with UV stabilizer for sun resistance, toughness and durability.

Porcelain insulators are fire-resistant and ideal for high fire risk areas. The type of insulators you require will depend on the type of post and the type of wire that you have selected for your electric fence. To determine the number of insulators you require: calculate the number of fence posts x the number of strands = number of insulators needed.

For corners and ends, use insulators made specifically to handle the extra wire strain. To determine the number of corner/end post insulators you require: calculate the number of corner/end posts x the number of wire strands = number of corner/end post insulators needed.



4. Tension the Wires

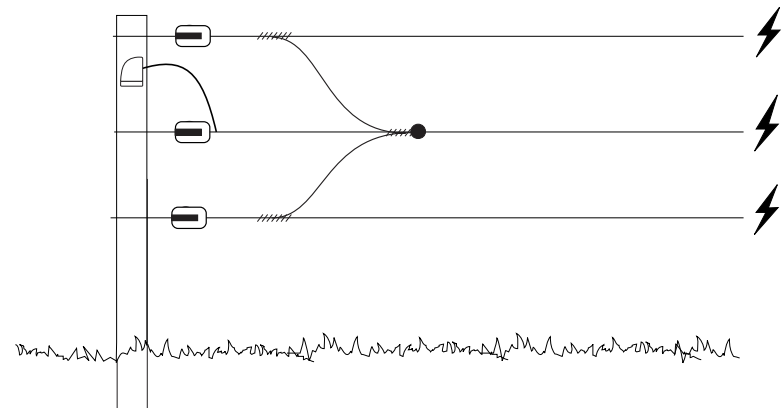
Tension the wires to approximately 90kgs using Permanent Wire Tighteners (G64304) and a suitable tensioning handle. If wild animal pressure is likely, increase the tension, especially on the bottom wires.

In regions where snow load is a problem or where wildlife may come into heavy contact with the fence, install permanent tension springs to help prevent the wire overstretching. Place permanent wire tighteners in the center of the fence so the wire pulls from both ends.



5. Complete Electrical Connections

Connect all live wires in parallel at both ends of the fence. This will ensure maximum conductivity. For a three wire fence, bring the tails, previously left long from the top and third wires to the second wire and connect firmly with a Joint Clamp (G60355). Make sure it's tight. Wrap the excess wire around this second wire and beak it off for a smooth finish. Bring the tail from the second fence wire to a Gallagher Cut Out Switch and where necessary break it off. This wiring configuration minimizes the number of joint clamps and creates a clean look.



Gallagher offers a range of insulators for attaching electric fence wires to your chosen post.

Wood Post Insulators

The Claw insulator provides a strong permanent attachment system with large shield. Alternatively Pinlock insulator products enable the wire to be temporarily removed from the fence while under tension. For example when wires need to be lowered for temporary vehicle access. Insulators are also available for equine fencing products including for tape and Equine Fence Wire. These are all attached to the post using staples, screws or flat head nails.

Steel Post Insulators

Gallagher manufactures quality double pinlock insulators for attaching electric wires to steel t-posts and y-posts as well as a topper cap for securing a top mounted tape or wire.

Fiberglass Clips

Attach wires to Fiberglass posts using metal clips.

Insulated Line Post Clips

Attach wires or tape to Gallagher Insulated Line Posts using specifically designed insulator clips.

TIP

Join wire using a figure eight or reef knot. These will give better electrical contact than a double loop join.



Reef knot



Figure 8 knot



Joint clamps

All other permanent connections should be clamped using Joint Clamps to ensure tight wire connections. Multiple joint clamp options are available.

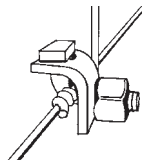
Cut out switches

Cut out switches are handy for isolating different sections of fence. This is useful when you are looking for faults or carrying out maintenance. Place cut out switches at gateway or junctions where a single or multiple fence line can be turned off.

Connect the undergate cable to one switch terminal and the tail of the second line wire to the other terminal.



Gallagher Recommends -
Re-tightening joint clamps as part of a regular spring fence maintenance program. G60304 angle joint clamp shown.



6. Gates and Gateways

Electrified Gates

Electric gates are low cost, effective and extremely easy to install. Choose from high visibility electrified spring gates, tape gates or bungy gates.

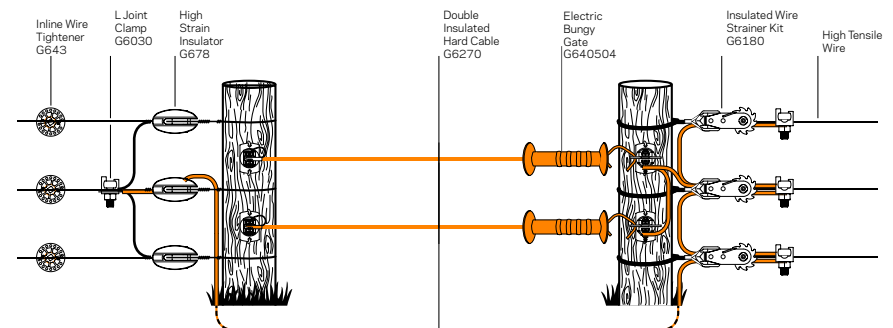
Tape gates provide the most visible gate solution. Choose spring or bungy gates where the gate needs to be stretched across a road to divert animals into the paddock.

Where possible, position gateways on flat, firm areas, away from steep banks where erosion could occur. Carry the power (and ground return if you have a ground wire return system) across the gateways preferably underground using double insulated cable in a pipe for protection and simple maintenance. Seal ends or turn ends of pipe down to keep out moisture. Bury the cable/pipe at least 300mm deep and cover with soil that is free of rocks and debris. Connect the cable ends to the fence using joint clamps or through a Cut out Switch.

All Gallagher electric gate kits are designed to be wired so that they lose their power source when unhooked. The included 3 way gate anchor has an activator plate which should be connected to the electrified fence wires using a piece of cable. When the gate handle is connected, the gate strand is livened from the activator plate.

CAUTION

Do not rely on electric gates to get power across gateways because when the gates are open power is lost to the fence. Also the conductor in an electric gate is not designed to carry high currents so the power will drop even when closed.



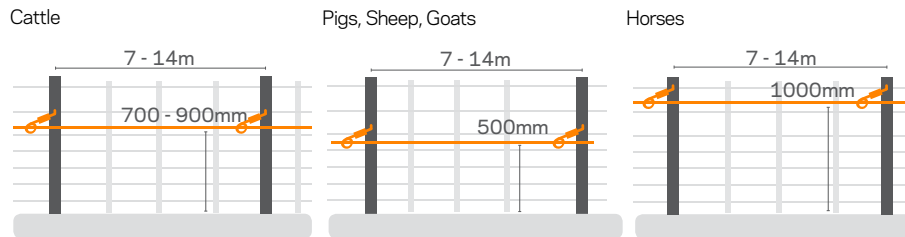
2. Retrofit Fencing

Offset brackets are fitted to a conventional fence to suspend an electrified wire (or wires) on one or both sides of the fence. The wire discourages animals from rubbing or pushing against the fence, thereby extending its life.

A variety of offset brackets are available to attach to wood post or steel fences, or to mount directly onto the wires of an existing non-electric fence (barbed wire, chain link, etc.).

Once you've chosen your offset brackets, see below for the recommended offset electric fence set up for cattle, sheep, pigs, goats and horses.

Fence Set Up



Retrofit electric fencing is an economical and easy to install option if you have an existing or new non-electric fence that you want to protect.



Offsets come in many options including live tips. The electrified end protects the offset by discouraging animals from rubbing against it.



A side mount ring top offset is a popular option for wood post fences. It provides complete freedom of the offset wire placement.



Offset wire mounts provide added protection for traditional fences. This protects your fence investment and extends the life of the fence.

Choosing offsets

Conventional fences can be made to last for many more years by attaching offset brackets with an electrified wire insulated on one or both sides of the fence.

Gallagher recommends attaching a single offset wire at two thirds the height of the animal to be controlled. If sheep and cattle are in the same area it is better to use two offset wires (one for sheep, one for cows). However a single wire three quarters the height of the sheep will still protect the fence from both animal types.

If the old fence is tangled or has broken wires, it will need to be repaired. Otherwise you will run the risk of loose non-electric wires causing accidental shorting on the electric offset wire. Change the worst wires and tighten the others where possible.

Wire offsets are made from galvanized high tensile spring wire, these offsets twist onto existing fence wires.

Ring top offsets are made from galvanized high tensile spring wire. This offset is stapled to the top or side of wooden posts. Double end variants are also available.

Live tip offsets are available as steel or wood post mounted. The electrified tip discourages stock from rubbing against them, reducing damage to the offset.

Mistakes made with an offset fence

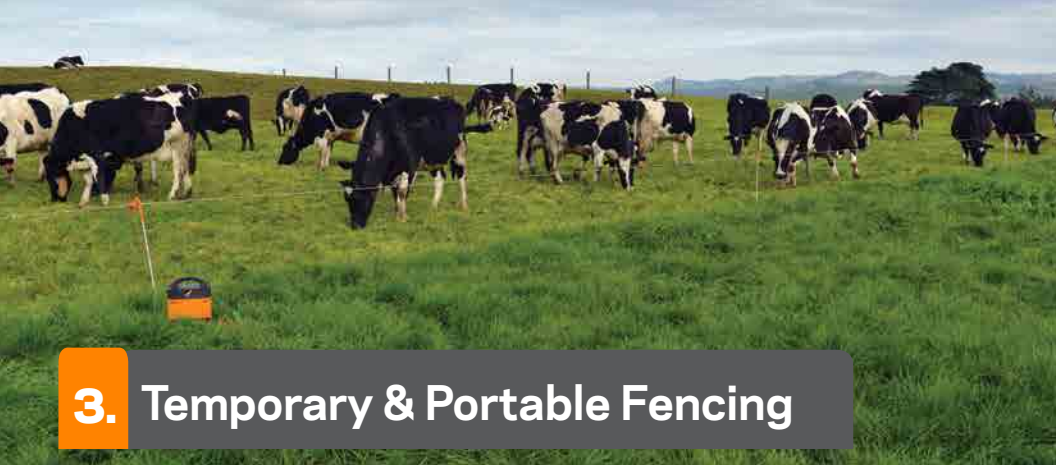
The most common error is the use of soft wire for the fence wire and for the offset bracket. High tensile wire should always be used for the fence wire, and only spring steel wire for the offset brackets. The bracket must be able to spring back in place after impact or it will become entangled with the wire of the old fence and short out.

The second most common mistake is the use of brackets that are too short allowing the live wire to remain too close to the fence it's attached to. Brackets should hold the live wire 150 - 300mm

from the old fence.

The placement/height of the live wire is also very important. It should be attached at two-thirds the height of the animal to be controlled. Two offset wires, can and often are placed on the same fence. On one side a wire is placed at 750mm to contain cattle, on the other side a wire is placed at 200mm to repel predators.

As simple as it is, offset fencing still must be viewed as a system. One short cut, or one substandard component can destroy the effectiveness of the fence.



3. Temporary & Portable Fencing

A temporary/portable electric fence can be powered by any Gallagher Solar or Battery Energizer or can be simply connected to a permanent electric fence supplied by a

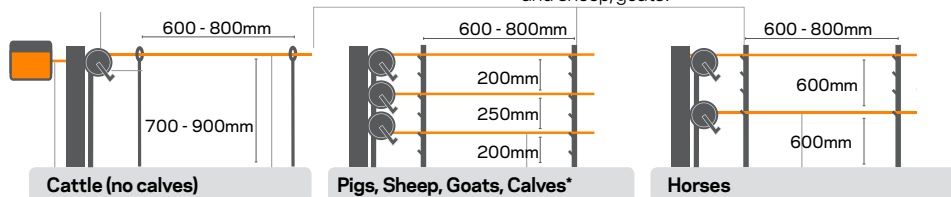
mains powered Energizer. As portable fencing is so easy to move and set up it's a versatile solution for fencing any type of animal, even on the most remote area of your property.

See below for the basics you'll need for portable fencing and the recommended fence set up for cattle, sheep, pigs, goats and horses.

Fence Set Up

Reels hold the tape, braid or wire for the portable fence. You can use just one reel for single line fences or up to three reels, attached to a reel stand, for multi-wire fences.

Posts are lightweight yet sturdy. Pigtail and Ring Top posts are most popular for cattle fences. Multi-wire treadins are used for all other animals. A new Multi-wire Ring Top post is suitable for cattle and sheep/goats.



*Note: Wire spacing will differ depending on the type of post used.

Electric Connectors are leads that connect a portable fence to an existing permanent electric fence.

Tapes, Wires and Braids are used on portable fences rather than the galvanized wire used on permanent fences. Gallagher conductors are ideal for portable electric fences as they are light, visible and easy to wind up onto reels.



The multiple lugs on Multi-wire Treadins allow attachment of a number of wires at different heights to accommodate a variety of animal types.



Ring Top Posts are a popular choice for cattle farmers. A single electrified wire is sufficient to contain even the most temperamental animals.



The Smart Fence 2, is an all-in-one portable fence. This instant fence system combines posts, reels and wire in one easily transportable package and is 100m long.

Temporary & Portable Fencing Wire Selection

PORTABLE FENCING CONDUCTORS

Type

Tape, wire or braid - depending on your fencing application you may want tape (high visibility) or braid (large diameter, woven product for better shock delivery and easier handling) or standard poly wire.

Conductivity

How much power and how far it's carried - the table below lists the most conductive product within each group first and compares voltage changes based on an animal (1000 ohms load) touching the fence.

Unique Design - The Gallagher difference for longer life and maximum effectiveness.

1 YEAR



Turbo products use **Mixed Metals** a balance of stainless steel and copper for maximum conductivity and long life.



Turbo tape products feature an **Interconnecting** wire, that regularly links all conducting wires, bypassing any broken wires to prevent power loss.

Conductor Selection Chart

		VOLTAGE AT BEGINNING OF FENCE	500m FENCE	1km FENCE	RESISTANCE* (Ohms/km)	MIXED METALS	INTERCONNECT	STRIPES	PRE-WOUND REEL OPTIONS AVAILABLE
Braid, Wire, Rope	5mm Striped Turbo Braid* G62153 100m		8kV	7.6kV	7.2kV	110	•	•	
	2.5mm Striped Turbo Braid G62184 200m G62186 400m		8kV	7.5kV	7.1kV	130	•	•	•
	5mm Turbo Rope* G62254 200m G62257 500m		8kV	7.5kV	7.1kV	130	•		
	2.5mm Turbo Wire G62054 200m G62056 400m		8kV	7.5kV	7.1kV	130	•		•
	2mm Poly Wire G62004 200m G62007 500m		8kV	2.0kV	1.0kV	6000			•
	12.5mm Tape	12.5mm Striped Turbo Tape G62364 200m G62366 400m		8kV	7.4kV	7.0kV	150	•	•
12.5mm Turbo Tape G62354 200m G62356 400m			8kV	7.1kV	6.4kV	250	•	•	
12.5mm Poly Tape G62304 200m			8kV	1.5kV	0.8kV	8500			•
40mm Tape	40mm Turbo Tape* G62454 200m		8kV	7.1kV	6.5kV	240	•	•	
	40mm Poly Tape* G62402 50m G62404 200m		8kV	3.6kV	2.4kV	2400			

*Recommended for horses

**Resistance refers to conductivity. Low resistance (i.e. 110 ohms/km) means higher conductivity, as less resistance to the electric pulse means it travels further. Calculations based on a fence load of 1000 ohms

Understanding Wire

There are a number of different types of portable electric fence wires, tapes and braids - frequently called "conductors". Knowing which one to choose can be a bit tricky - especially for those new to electric fencing.

The most common portable/temporary fence "conductor" is what is called Poly Wire. Poly Wire is made of plastic strands and embedded thin metal wires used to carry electrical current from a Fence Energizer. The individual strands of plastic and wire are typically twisted tightly together to form a single wire. Wires less than 3mm in diameter are popular for cattle, sheep, goats and pigs, while larger 5mm diameter versions are suitable for horses due to improved visibility.

A second option is Poly Tape. Poly Tape threads individual strands of plastic and wire together creating what appears to be a highly visible ribbon. Tape while prone to wind and ice damage, is the most visible "conductor" and is best

used in situations where maximum visibility is needed. Poly Tape comes in different width sizes, 12.5mm and 40mm. Gallagher recommends 12.5mm tape be used for portable horse fence applications.

A third option is Poly Braid. Poly Braid is a superior construction than Poly Wire, and is less likely to be damaged by the wind and ice than Poly Tape.

Poly Braid consists of individual strands of plastic and wire that are braided together to form a tight weave making it more durable, and less prone to tangles and overstretching. Poly Braid comes in a number of different diameters (thickness).

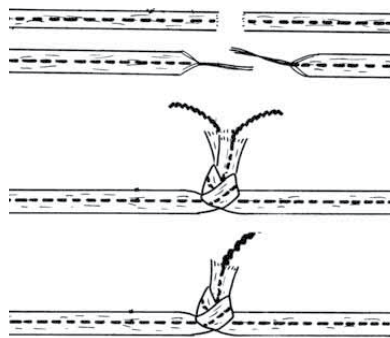
Turbo products are always the best choice for distances beyond 200m where dependable power is required.

Electrical Connections

It is important to have good conductivity through the connection when you join wire or tape.

To do this, separate the metal strands by melting a strip of plastic threads with a match or lighter approximately 50mm from the ends of each length. Pull the end off the plastic being careful not to break the steel wires. Tie both ends of the wire/tape together and then twist the steel wires together.

To join 40mm Tape use a Tape Joiner. These also give good electrical contact.



So what is Turbo Wire and how is it different from Poly Products?

Turbo products come in the same wire, tape and braided construction previously described for Poly - with one major difference. Turbo products have 9 strands of conductive metals including copper which make them up to 48X's more conductive than Poly products which only have 6 strands of stainless steel. This means with Turbo, your voltage will stay strong and carry a "shock" further down your fence line than Poly products. Long temporary fences (over 200m) should always be constructed from Turbo products to ensure maximum livestock control.

Why is copper so important?

Some metals conduct power better than others. Metals that are good conductors have a low resistance and metals which are poor conductors have high resistance. Copper happens to be a very low resistance conductor which enables Turbo products to carry power further down the fence line than Poly products. The copper wires in Gallagher's Turbo products are tin coated. This is why if you pull the plastic and metal strands apart, you will not see copper colored wires. The advantages of tinned copper over a non-tinned copper wire is greater longevity. Copper coated in tin is less susceptible to corrosion and is even more conductive!

What does it mean that "Turbo is 48 x more conductive than Poly"?

What this means is that if you built two different fences 1.0 km long and one was a single strand of Poly Wire and the other was a single strand of Turbo Wire - both fences would read 8,000 volts at the start; however, at the end of the fence you would only read 600 volts on the Poly Wire fence while the Turbo Wire fence would read 7,100 volts should an animal touch the wire.

The resistance of a "conductor" (wire/tape/braid) is measured in Ohms. The lower the resistance, the more conductive the wire/tape/braid will be. As you can see from the values below, Turbo Braid is 48 times more conductive than Poly Wire.

Turbo Wire - 130 Ohms/km
Poly Wire - 6000 Ohms/km

Portable Fence Posts

When installing a temporary fence, there are several durable, portable fence post options available.

Many portable fence posts come with a tread-in feature. At the base of a step-in post, there is a footplate that allows you to push the post into the ground with your foot. This is a convenient feature so you won't need to drop your bundle of posts in order to drive them into the ground.

Other factors to consider are visibility, durability and the ability to add multiple wires for the animal needing to be fenced. Weather also influences selection as posts are much more difficult to insert into frozen ground.

Plastic Posts

Plastic tread-in posts with built-in foot plates are convenient because they have pre-molded loops for multiple wires at various heights. Gallagher plastic posts are made from a heavy duty, UV-resistant polymer plastic and have a steel foot.

Steel Posts

Steel tread-in pigtail posts are also available. These posts get their name from the curl loop that holds the wire and looks similar to a pig's tail.

Gallagher's Ring Top posts have a very high strength glass filled nylon head and foot coming in both a standard and heavy duty model.

Gallagher's Ring Top post while similar to the Pigtail, has a ring shaped nylon head that prevents wear and reduces tangles. The post's glass reinforced nylon footplate is strong and will not bend. A multi wire Ring top post is also available while a lower cost Steel Post Treadin is a budget alternative.

Fibreglass Posts

Fibreglass posts are better for situations when the fence is not going to be moved as often because these have to be driven into the ground. These posts require the use of wire clips or plastic insulators that slide on the post to hold the wire in place.

Rolling Posts

The Tumblewheel enables you to quickly and easily roll a fence line to a new position. The Tumblewheel's unique center hub maintains power while the fence is being moved. It can be used on flat very hard and frozen ground. The legs remain live except for two legs that are on the ground.

Where several breaks are needed in one paddock, Tumblewheels are ideal for quick and efficient rationing of grass. We recommend spacing at every 15m.

This fence consists of a number of electrified 'wheels' spaced across the pasture. The wheels are held upright with the tension of the single line fence which passes through the center.

When one or both ends of the fence is moved, the wheels roll along. When you stop, the fence stops.



Reels

Reels are an absolutely essential component of your portable electric fencing equipment.

They are designed to hold your wire, braid or tape and make it extremely quick and easy to roll up your temporary cross-fences.

Gallagher's geared reel comes with a locking device allowing for secure attachment to a bike or fence wire. Geared reels also have a 3:1 ratio which means for each turn of the handle, the bobbin spins three times allowing you to wind your wire three times faster than non-geared reels.

Geared reels are designed to lock the spool in place so it does not unravel. The hook on the lower section of the handle allows you to hang the reel off of your permanent high-tensile electric fence.

An alligator clamp (also called a lead connector) is used to create a good electrical connection between the portable electric fence and your permanent electric fence.

Use an insulated handle on the far end of your portable fence so the fence is only electrified from one side (at the geared reel). This ensures that the portable fence loses power once you disconnect the alligator clamps and geared reel so you can roll up the wire without getting shocked.

When rewinding long lengths of poly/turbo wire, braid and tape, the geared reel is a worthwhile, time-saving investment.



Portable Fence Construction

Reels holding wire/tape can be used individually for single line fences or for up to three lines or by attaching the reels to a reel stand.

Single Wire Fence:

1. Hook the reel to the anchor point (e.g. permanent fence/reel stand) and disengage the ratchet latch.
2. Carrying the insulated handle and sufficient portable posts, walk along the proposed line allowing the reel to unwind and connect to the other end.
3. Walk back to the reel, placing a post every 1.2m (or closer on uneven ground) and locate the wire/tape in the post.
4. At the end of the fence, engage the ratchet and tension the wire.
5. Connect to power – either connect to the permanent fence by connecting leadset to both powered permanent fence line and the portable wire or using a solar or battery Energizer.
6. When you remove the fence, do the same process in reverse.

CAUTION

Do not wind the conductor through the posts as the abrasion will damage the post.



Multi-wire Fence

1. Attach the required reels to a reel stand & chain the reel stand to an anchor point.
 2. Hook the insulated handles through the head/lug of the first post to prevent them becoming twisted.
 3. Follow steps 2-6 above only this time with multiple lines together not one single one.
- Note** – place posts every 8 - 10m and use a multi-reel lead connector if using a battery Energizer to connect the fence to a power source.

All in one multi-wire portable fence system

A quicker and easier all in one instant fence system, the Smart Fence System includes 4 wires, 10 posts, 100m length. Energizer is sold separately.



Searching for a fault

A short is a fault somewhere on the fence that has caused it to lose power. The most common types are vegetation overgrowth, loose wires and broken insulators.

Gallagher has some great tools for testing and finding these quickly and easily.

- Fault Finder - shows voltage, current and direction of fault (an i Series Remote also has this function)
- Fence Volt Meter - a digital read out of the voltage at that point on the fence
- Live Fence Indicator - sits on your fence line and flashes with each pulse over 2kV so you can see from a distance

To trace a fault using a volt meter travel along the fence line and check the voltage about every 100m . If the short is serious, the voltage will continue to fall until the fault is reached. If the fault is passed the voltage will remain fairly constant. You should then backtrack to find it. At fence junctions isolate different fences with a Cut Out Switch to try to isolate the fault.

Using a Fault Finder

1. Place the Fault Finder or remote on the fence with the wire in the measurement slot and making good contact with the contact plate.
2. The arrow on the LCD display will indicate which direction the current is flowing. The amount of current (Amps) and voltage (kV) will show on the display. The higher the current, the bigger the fault.

Travel along the fence line checking the readings every 100m or so. If the current reading drops significantly the

fault is back towards your previous reading. The process is similar to finding water leaks, where the Fault Finder is reporting the amount and direction of the flow.

Multi Wire Fences

When the fence has multiple live wires, the current should be measured on each wire. Assuming the live wires are connected in parallel at each end of the fence the total current flow is the sum of the current on each wire.

When one wire has a much higher current reading than the others, either this wire has the fault on it or the wires have not been connected in parallel at each end of the fence line and this wire only is supplying power to the next section of fence.

Induction

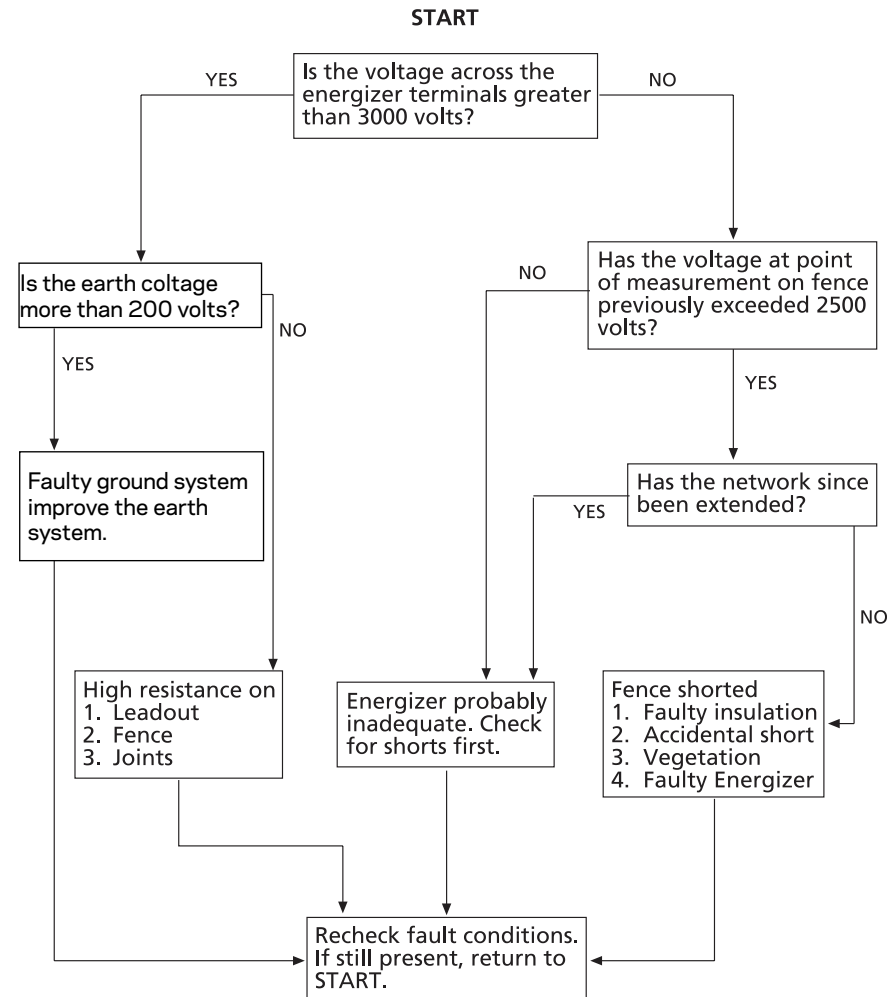
Induction is the transfer of voltage from a live wire to a neutral wire by electromagnetic rather than direct physical contact.

If you are getting a small shock from "non-live" wires or steel gates, particularly in dry weather, this is likely to be caused by induction. Neutral wires (neither live nor ground) can be charged from live wires (usually leadout or offset wires), running in parallel. It is not a short and will not reduce fence voltage.

To remove the problem, earth out the offending wires by pushing a heavy gauge galvanized wire as far as possible into the ground next to the strain post and staple it across the offending wires. This will not reduce the voltage on the insulated powered wires.

Establishing What is Wrong with Your Fence

If you find there is not enough power on your fence follow the chart below to find the most common causes.



Here are some safety considerations to follow when installing electric fencing:

General safety

Don't touch fences with your head or mouth. People with pacemakers or other heart problems also should consult their doctors before working with or near electric fences. Always use precautions.

Energizer installation

Only connect one energizer to a fence.

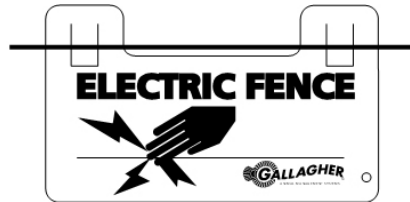
Can electric fences cause fires?

There is a misconception that dry vegetation touching an electric fence can cause fires – this is extremely unlikely. In order to create a short, vegetation needs to be damp or green so therefore the vegetation will not ignite. Once vegetation dries out it becomes non-conductive meaning any short created disappears.

The only conceivable but still very unlikely scenario where an electric fence could start a fire is when a wire shorts to an earthed metal object, such as a steel post or wire where insulators have broken, in the presence of abundant dry vegetation. This scenario is very unlikely to occur in practice, and even less so on a well-maintained fence.

Producers with fences on steel posts or those using earthed wires in the fence are advised to ensure the live wires are well insulated and the fence is clear of vegetation. If these factors are of concern then on days of severe or above average fire risk, consider turning the energizer off.

Earth stakes for energizers should be at least 20m from utility grounding fields.



Electric fence construction

Be extremely careful when running temporary or permanent fence wires under power lines on rolling ground to ensure that the fence wire does not inadvertently come into contact with the power lines.

Do not attach fence wires to utility poles.

Electric fences bordering public thoroughfares are required to have a warning sign at least every 90 metres where the public has access to electric fences, such as along roads.

Check with your local authority for specific regulations.

Land owners are responsible for preventing audible interference with telephone lines. Therefore, try to avoid installing electric fences under telephone wires, and minimize the distance that electric fence wires run parallel to underground telephone cables.

This particularly applies if the electric fence wire is carrying high current, such as a leadout wire to a large fencing system. (See 'Telephone Interference' pg 46)

Barbed wire

Never use barbed wire for electric fence wire because people or animals could more easily become entangled in it.

Radio Interference

Keep electric fences as far away from radio antennas as possible. Gallagher energizers comply with usual Telecom and International standards and safety regulations. However, problems can arise for a number of reasons and can be difficult to eliminate in areas with poor radio reception.

To avoid radio interference:

- The energizer earth must be highly conductive
- The energizer must be well away from any electrical power supply
- The energizer should be well away from any water pipes

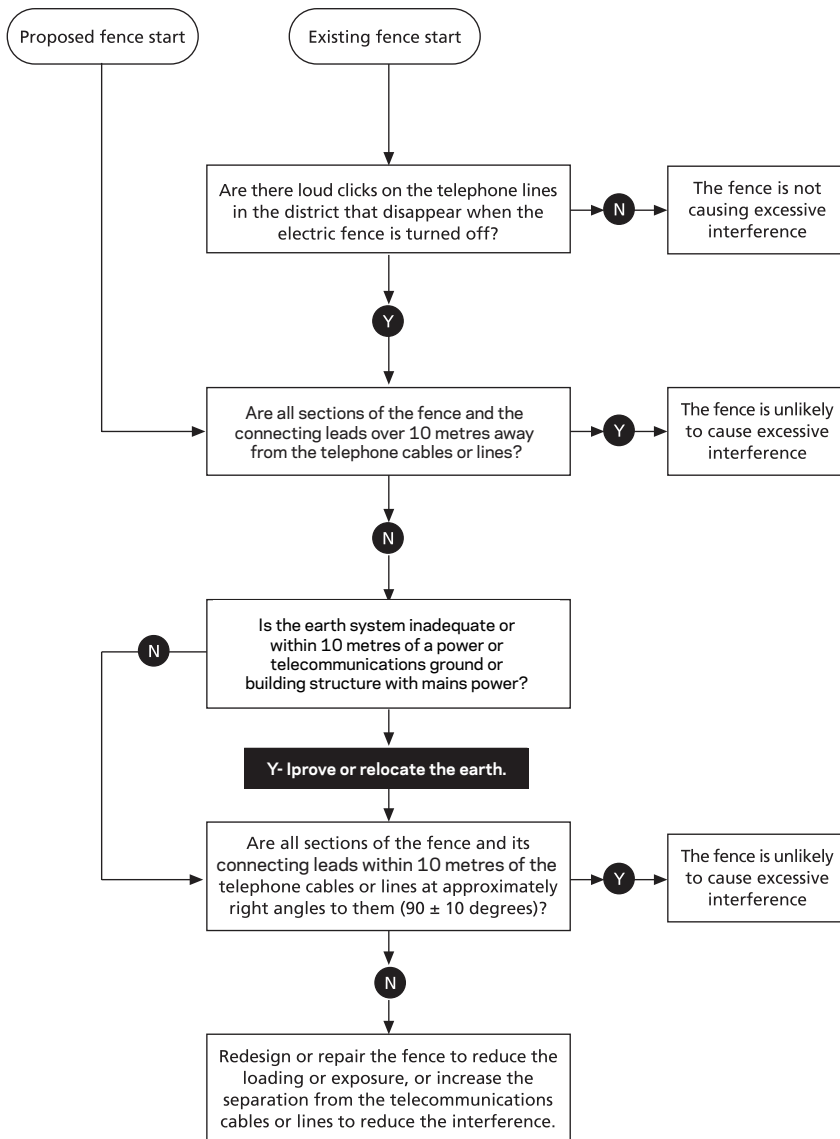
Do not allow an energizer earth wire to touch a building which can act as a broadcast aerial. Use proper leadout cable to insulate the earth wire. Earth the offending radio and improve its aerial. Try to keep both as far away from the energizer and fence lines as possible.

All types of wire may break and recoil when stretched. Always use hand and eye protection when handling hi-tensile wire.



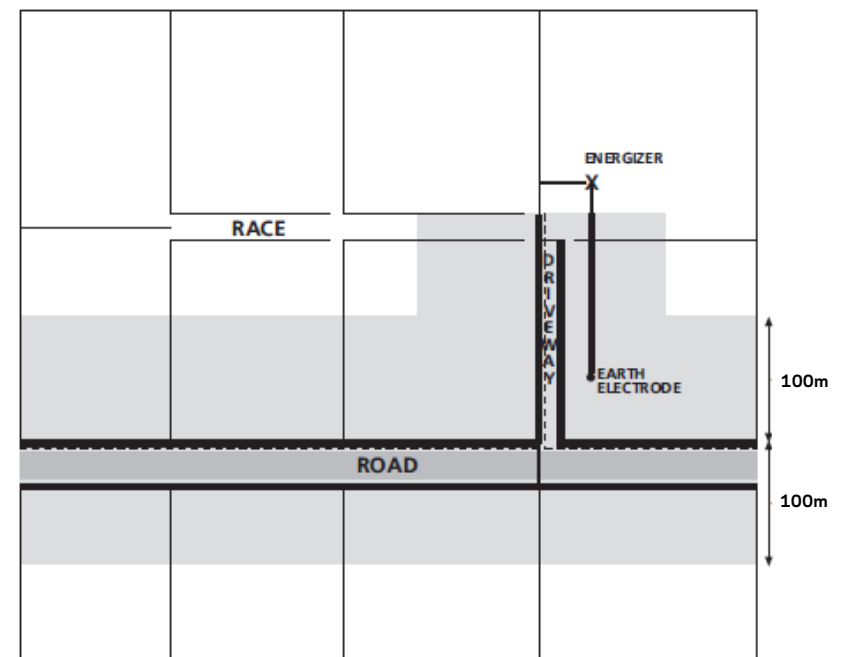
Telephone Interference

Use the following chart flow to determine if your fence is likely to be causing interference on telephone lines.



Designing electric fences to prevent interference

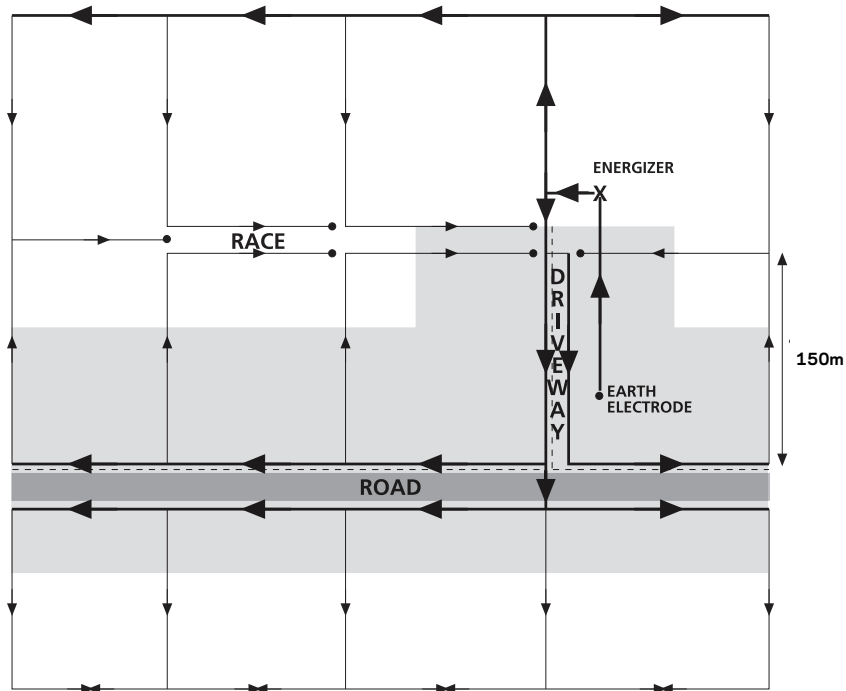
1. Draw a plan of the property approximately to scale showing:
 - All electrified wires.
 - The connecting leads between Energizer, fence and earth stakes.
 - Wires crossing gateways and roads (including underground)
 - Communication cables/lines
 - A 200m wide shaded stripe centred on each side of the communication cables/lines
2. Highlight any electric fence wires
 - Within the shaded area
 - That run parallel to communication cables/lines and are within 100m of them (running at right angles is OK and shouldn't cause a problem)



--- Telephone cable

What Not to Do - an interference heavy layout

1. Highly conductive lead out line runs down the driveway/road, adjacent to communication cables/lines
2. Earth stakes are connected in parallel to communications cables/lines
3. Highly conductive lead out line is less than 100m from and not at right angles to, communication cables/lines when it crosses the road

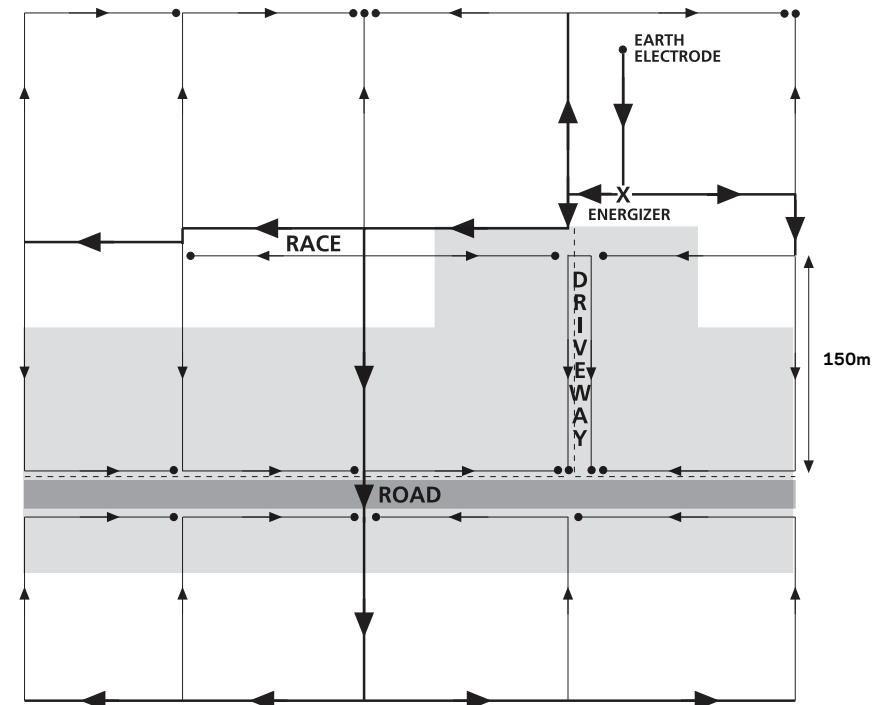


KEY

- ▶ High current section of the electric fence
- ▶ Low current section of the electric fence
- Low current dead-end section of the electric fence
- - - - Telephone cable

What To Do - a clean fence

1. Energizers and lead out are at least 100m away from communication cables/lines.
2. Sections of the fence that are less than 100m away are as short as possible and left open-circuited at the far end (i.e. nothing connected to the far end).
3. Electric fence ground is separate from all other earthing systems, is as short as possible, and is routed away from communication cables/lines.



KEY

- ▶ High current section of the electric fence
- ▶ Low current section of the electric fence
- Low current dead-end section of the electric fence
- - - - Telephone cable

Common electric fencing issues & solutions

#1 Energizer is not on or there is no volt meter reading across the energizer output terminals with the energizer disconnected from the fence.

Potential Causes:

1) Mainline power outage or blown fuse on input circuit
Solution: Restore power or replace blown fuse

2) Energizer is switched off or in Standby mode
Solution: Check energizer "on-off" switch.

3) Dry cell batteries are dead; wet cell batteries are discharged
Solution: Recharge or replace batteries

4) Battery terminals are corroded
Solution: Clean terminals

5) Energizer is faulty
Solution: Have energizer serviced

#2 Energizer is on, but volt meter reading is low across the energizer output terminals when disconnected from fence.

Potential Causes:

1) Weak batteries
Solution: Recharge or replace batteries

2) Battery terminals are corroded
Solution: Clean battery terminals
Troubleshooting

3. Energizer is faulty
Solution: Send for repair

#3 Energizer is operating, but there is no volt meter reading on the fence with the energizer connected to fence and earth

Potential Causes:

1) Ground-return or fence lead-out wire is disconnected or broken
Solution: Connect or repair fence or an earth-return wire

2) Broken, corroded or disconnected live wire or earth-return on fence
Solution: Connect or repair live wire or earth-return on fence

3) Soil is dried out
Solution: Install an earth-return wire

#4 Low volt meter readings at several locations on fence

Potential Causes:

1) Energizer is on low setting or is inadequate for length of fence
Solution: Switch energizer to high setting; install more powerful Energizer

2) Weak batteries
Solution: Recharge or replace batteries

3) Terminals corroded
Solution: Clean terminals

4) Earthing system is inadequate or deteriorated
Solution: Repair or replace ground system

5) Soil is dried out
Solution: Install an earth-return wire

6) The fence has faults
Solution: Repair fence faults

#5 No volt meter readings at several locations on fence

Potential Causes:

1) Broken or disconnected fence wire, underground cable or earth wire
Solution: Connect or repair wire; remove cause of short; fix connection with a joint clamp

2) Earth stake connection deteriorated
Solution: Replace ground rod connection

3) A Cut Out Switch has been left open
Solution: Close Cut Out Switch

#6 Volt meter reading on one wire is higher than on another wire, or there is no reading from one live wire to earth-return or soil

Potential Causes:

1) Broken or disconnected fence wire, connecting wire or earth wire
Solution: Connect or repair wire; remove cause of short; fix connection with a joint clamp

2) Broken or faulty insulators
Solution: Replace faulty insulators

3) Earth stake connection rod deteriorated
Solution: Replace earth stake

#7 Radio, TV or telephone interference

Potential Causes:

1) Earth system inadequate
Solution: Increase earthing capacity

2) Antenna too close to fence
Solution: Relocate antenna or telephone wires

3) Fence is parallel with antenna wires or telephone lines
Solution: De-electrify or relocate segment of fence that is parallel to or too close to antenna or wires

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