Please keep to hand for reference...

FARM WELL .... FARM SAFELY

ESB Networks

www.esb.ie/esbnetworks

INTRODUCTION

Farm safely and you will farm well

Electricity has contributed significantly to improving the lives and well being of farmers and their families over the years. The availability of electricity to power the services essential on a modern farm has contributed to prosperity and to greater efficiency in farming.

Electricity is a powerful but safe energy when it is treated with care and with a common sense attitude to safety. Just like other aspects of farm life – handling animals, working with machinery, handling chemicals, etc. – an awareness of safe practices is essential in order to minimise the risk of injury or death. There is now a legal responsibility, under the terms of the Safety, Health and Welfare at Work Act, on all farmers to ensure that their premises are safe and do not pose a risk to either employees or visitors. This is a serious responsibility and this booklet will assist farmers in ensuring that the electrical installation and the work practices in dealing with electricity are safe.

The old saying "A little learning is a dangerous thing" is very relevant when it comes to an electrical installation. Handyman-type installations and temporary repairs consistently feature in the records of fatal and other serious electrical accidents on farms. Engaging an Electrical Contractor to carry out work in accordance with ETCI Wiring Rules is always the correct action. Then, having your installation checked regularly and kept in good order will help to make sure that you, your family, your employees and visitors will be protected from unnecessary danger.

ESB Networks

THIS BOOKLET IS PRODUCED BY
ESB NETWORKS IN CO-OPERATION WITH ETCI
(ELECTRO TECHNICAL COUNCIL OF IRELAND)

ETCI
Electro-Technical
Council of Ireland Limited

CONTENTS

GENERAL GUIDELINES

DOs and DON'Ts

Do ensure that everyone on the farm is conscious of the need to be careful when using electricity.

Do have regular inspection and maintenance of your electrical installation carried out by a competent person.

Do contact an electrical contractor when in doubt about the safety of equipment or the installation.

Do check portable electric tools and particularly their flexible leads and plugs, for any defects before use.

Do switch off, lock off or unplug equipment before starting any maintenance or repair job.

Do ensure that all electrical equipment and fittings are designed for farm use in accordance with ETCI Rules.

DON'T

Don't use domestic-type sockets, plugs, switches, etc. in farm buildings.

Don't continue to use faulty equipment or circuits; if in any doubt switch off and call an electrical contractor.

Don't extend cables or flexes by twisting wires together and taping over.

Don't route wiring or trailing leads where they can be damaged, e.g. through corrugated sheeting.

Don't allow trailing leads to become a permanent part of an installation.

Don't connect any portable tools, de-horners or infra-red lamps into lampholders or through lighting circuits.

Never take chances with Electricity.
Call in the experts.

The Electrical Installation on Farms

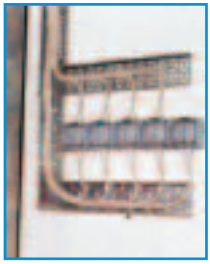
The working environment on farms is much more onerous than in a domestic situation; for that reason it requires a higher standard of electrical installation with special emphasis on safety. The presence of water, dust and corrosive atmospheres – as well as the greater likelihood of physical damage from animals or vehicles – can be hazardous if the incorrect type of electrical fittings are used. For these reasons the National Wiring Rules make specific provisions for agricultural and horticultural premises. The Rules specify the type of switches, sockets, plugtops, light fittings, etc. that MUST be used in farm installations.

All new electrical installations on farms, including extensions to existing installations must comply with these special requirements. In the interests of safety it is recommended that existing installations be brought up to these standards.

Over the next 2 pages you will find check lists to enable you to assess the standard of your installation. If you are unsure about any points make a list and discuss these with an electrical contractor.

Installation Check List:

- Are all wiring cables of a suitable size for the load?
- Are all cables securely fixed, clipped and tidy?
- Are underground cables buried at least 750mm (2'6") below the surface and mechanically protected where necessary?



- Where underground cables emerge from the ground and are fixed to walls or buildings, are they mechanically protected for 1.25 metres (4'6") above ground level?
- Are all overhead electric cables at least 6 metres (20') above ground level, especially over roads, or gateways used by high loads or machines?

- Are there any (makeshift) twist joints on cables?
- Is there any damage to the insulation on electric cables?
- Are cables correctly connected into termination boxes in equipment - connection boxes, light switches, sockets, etc.?
- Are the appropriate glands used, especially on armoured cables?
- Are all cables which are at risk of attack by vermin or damage by farm animals suitably protected?

- Is there an isolating switch marked ON and OFF controlling the electrical installation in EACH detached building?
- For all equipment which is used only on a seasonal basis is there a separate switch, clearly marked ON and OFF, with the name of the equipment controlled.
- Are all motor starters located with a clear view of motor positions and easily accessible; does each starter have its own isolating switch?
- Is all switchgear mounted on non-flammable surfaces?
- Does all equipment, including light fittings have a minimum degree of protection to IP44 Rating (or 45/54 as appropriate – see page 7)?
- Are all heating appliances permanently fixed and connected and are they securely mounted out of reach of live stock? Are they positioned so that they are unlikely to come into contact with or cause ignition of flammable materials?

Switchgear and Electrical Equipment

The National Wiring Rules frequently refer to IP Ratings for electrical equipment and fittings. IP Stands for Index of Protection and is followed by two numerals. For example, a light fitting may be rated IP 44; or, you may read that the Wiring Rules may specify that in a particular location fittings should have an IP 55 Rating.

ALL switchgear, plugs and sockets used on farm buildings must be of an industrial type and comply with the standards in IEC Publication No 309. They must offer a MINIMUM IP 44 degree of protection against the entry of foreign objects and moisture.

IP Ratings explained:

The first numeral indicates the level of protection against physical contact with live parts of the fitting and against the ingress of dust.The second numeral indicates the level of protection against moisture penetration.

First Numeral

Protection of persons against contact with live or moving parts inside the enclosure and protection of equipment against ingress of solid foreign objects.

Number/ Degree of Symbol	Degree of Protection
4	Protection against contact with live or moving parts inside enclosure by tool, wires or such objects of thickness greatness than 1mm. Protection against ingress of small foreign objects.
5	Complete protection

Second Numeral

Protection of equipment against ingress of liquid.

Number/ Symbol	Protection
3	Rain proof
4	Splash proof
5	Water-jet proof

Let's take, as an example, a piece of electrical equipment with an IP44 Rating.

The first numeral 4 means that the item is protected to Level 4 (on a scale of 1 to 6) against physical contact with live parts and against small foreign objects.

The second numeral 4 means that the item is protected to Level 4 (this time on a scale of 1 to 8) against the entry of liquid.'Raindrop' symbols are also used to denote protection against the entry of moisture.

The MINIMUM level of protection for ALL fittings in farm installations is IP44 – for light fittings, mains electric fences and all other equipment such as plugs, sockets, lightswitches, motor starters, isolators and fuseboards.

In WET LOCATIONS – milking parlours, dairies, etc. the MINIMUM protection level against moisture is increased to 5 for ALL electrical equipment.

In DUSTY locations – grain stores, etc. – the MINIMUM protection level against dust is increased to 5 for ALL electrical equipment.

The Wiring Rules may specify a Rating of IP X5 or IP 5X. In cases like these the position of the numeral indicates the predominant index of protection to which the installation/equipment must comply. The ETCI Wiring Rules contains the full IP table.

Examples of equipment suitable for farm use

Milking Parlours and Livestock Sheds

The Importance of Equipotential bonding

Because cattle are even more sensitive to electric shock than humans it is crucially important to minimise voltage differences which can occur between metal components and earth in locations such as milking parlours and live-stock sheds. The way this is done is through equipotential bonding. What this means is that every part of the exposed metalwork is electrically bonded together and bonded to earth so that there are no potentially dangerous voltage differences to cause electric shock.

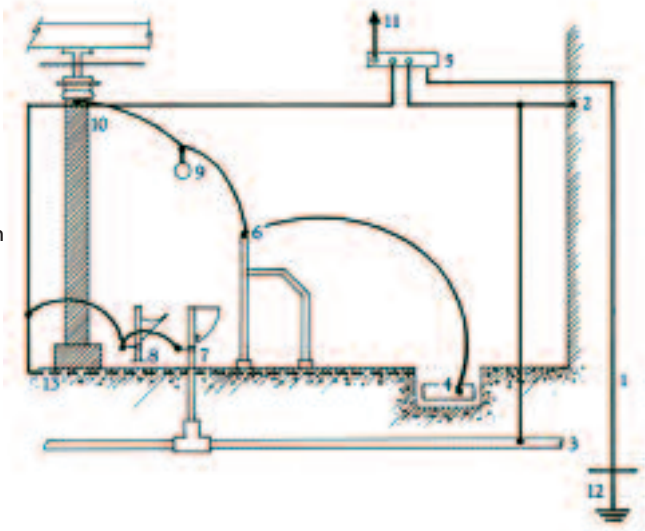
In order to keep within specified values of touch voltage, the earthing and bonding system must be adequately designed and installed; the following diagram shows typical bonding arrangements in a milking parlour. It should be noted that, apart from the danger to life, quite low voltages can reduce milk production and cause mastitis in cattle.

Example of a typical milking parlour

In order to reduce the possibility of stray voltages to a minimum it is recommended that a metal equipotential bonding grid should be located in the floor of milking parlours. The connections from this floor grid to the main bond structure of the milking parlour should be at least duplicated – connections being made at opposite sides of the grid.

Whenever possible the milking parlour furniture should be connected to the floor grid when they are being installed in the floor. This would be in addition to the normal bonding connections in the milking parlour.

1. Earthing Conductor
2. Metallic Partitioning
3. Water Pipe
4. Manure Removal Device
5. Busbar for Equipotential Bonding
6. Tethering Device.
7. Automatic Watering System
8. Feeding Apparatus
9. Milking Apparatus
10. Steel Structure
11. Protective Conductor from Main Earthing Terminal
12. Local Earth Electrode
13. Metallic grid in floor



In new installations the standard concrete reinforcing mat may be used for this purpose. In an existing milking parlour the bonding grid may be located in a screed laid on the existing floor; or it may be provided by inserting bonding conductors in slots cut in the floor.

Detailed information and specifications are contained in Section 705 (and supplements to it) of the ETCI Wiring Rules. N.B. It is also recommended that a special bonding busbar be installed as part of the bonding system.

The information on this page related to equipotential bonding is for general guidance only. Farmers building new milking parlours or livestock sheds (or carrying out renovations to the structure or electrical installation) should ensure that the building and electrical contractors install equipotential bonding in accordance with the ETCI Wiring Rules.

Portable tools

All portable equipment is potentially more dangerous than fixed appliances. The equipment itself and the electric leads can more easily become damaged and the working locations may themselves pose additional hazards.

Where possible portable equipment should be double insulated. It should carry a recognised safety approval mark. Low voltage equipment, operating at 110 volts from a transformer is to be recommended in more onerous conditions. Hand lamps should be a maximum of 25 volts.

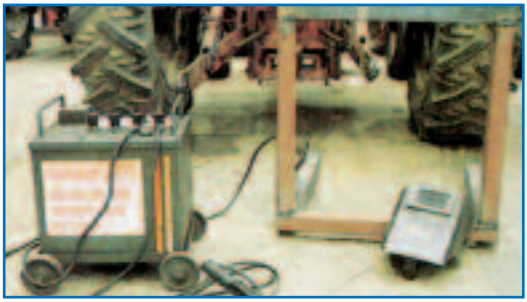
If it is not possible to operate equipment at reduced voltage, it should be used through appropriate sockets which are protected by means of 30mA RCDs. (see Page 30)

Before using any portable equipment it should be carefully inspected for any damage; particular attention should be paid to the flexes and any worn or damaged ones replaced before use.

Plugs and Sockets

Industrial-type plugs and sockets (with a minimum IP Rating of IP44) must be used in farm buildings. Two types and sizes will cover almost all uses on farms. The 16 Amp size will supply most portable tools but the larger 32 Amp size should be used for electric welders. Plugs and sockets for use in areas likely to be hosed down must have a higher degree of protection against water (IP55) as illustrated.

Electric Welders



Electric welders can be powered either by alternating current (a.c.) or direct current (d.c.). The output voltages from welding sets are typically in the range for 80 to 100 volts. In general, welding by direct current is safer.

Because currents of 300 Amps or more are needed for welding a 32 Amp plug and socket is recommended. All parts of the welding circuit (including the return path) must be of adequate conductivity.

A welding return lead is essential; if you rely on a return path via structural steelwork, metal pipes, etc., there is a greater risk of electric shock or fire.

Great care must be taken to protect the skin from heat burns and to protect the eyes from the intense ultra-violet light. The eyes can be permanently damaged by exposure to the ultra violet light of electric arc welding.

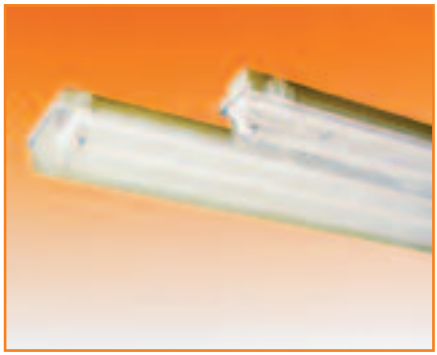
Stand-by Generators

They are frequently installed for emergencies, stand-by or convenience purposes.

Special rules apply to the connection and use of generators. It is, for example, a requirement that ESB be notified by anyone operating or proposing to operate a standby generator. This is necessary in order to protect ESB staff and other customers should a breakdown occur on ESB lines. If incorrectly installed a private generator can cause what is known as a back-feed along an ESB line that is presumed dead posing a serious risk of electric shock to maintenance staff and to other customers.

Lighting Installations

Lighting is used both for working areas and as a safety measure in its own right- making hazards visible after dark. The range of light fittings used on farms will generally vary from large outdoor lights using mercury, sodium or tungsten halogen lamps; standard fluorescent in livestock sheds and milking parlours; compact fluorescent and ordinary tungsten bulbs.



All light fittings should be chosen to match their working situations and to comply with the IP Ratings in relation to water and dust proofing (See Page 6). You should also remember that the atmosphere in livestock and poultry sheds can be very corrosive of metal fittings. In fact, light fittings which are anti-corrosive are recommended for all farm installations.

Protection against dust and moisture

When selecting fittings for areas where the atmosphere is dusty or where the area is hosed down it is crucial to use fittings appropriately protected against dust and/or moisture. Typically, corrosion proof fittings, sealed against the entry of dust and water will be required in milking parlours, feed preparation areas and livestock sheds. Totally-enclosed fluorescent fittings with an IP65 Rating are readily available in single and twin-lamp versions. It is also recommended that fittings with polycarbonate diffusers (covers) are selected as they are better able to withstand impact.

Pendant fittings

Pendant fittings consist of a ceiling rose, a length of heat resistant cable, the lampholder and a shade or diffuser.The ceiling rose and the lampholder should always have a means of gripping or supporting the cable sheath in order to prevent strain on the cable connections.

All lampholders for use in farm buildings must have an earthing connection and should use heat-resistant three-core cable. In many older ceiling roses, earthing terminals may not be present and in these cases a metal light fitting must not be used.

Fluorescent fittings in low temperatures

Where fluorescent lights are used in cold situations, e.g. open barns, livestock sheds they will operate more reliably if they are fitted with electronic starters. If they are of the sealed/enclosed type they will also be more reliable and efficient in operation.

Outdoor Lighting

Outdoor floodlights for farms will be subject to severe weather conditions and a protection rating of IP55 is recommended. Fittings with mercury or sodium discharge lamps are more efficient than tungsten halogen and have a very long lamp life (2-3 years under typical conditions). When relamping check the weather seals to ensure they are not deteriorating.

Electric Heating

Various types of heaters are used for rearing young pigs and poultry.

The infra red lamp, also known as a bright emitter, consists of a heating element inside a reflectorised glass bulb. Unless the bulb is of 'hard glass' water drops can shatter it. For that reason it must always be protected by an outer protective cover.

Because infra-red lamps and fittings are generally used for just a few weeks in Springtime maintenance can often be neglected.All the connections in the fittings should be carefully checked before use and special attention should be paid to the earth connection to ensure that it is secure.

A new type of infra-red lamp fitting is now available which does not require an earth. It is double insulated and comes complete with a guard over the bulb.

Electric heat pads

A recent development in electric heating for pig-rearing is the use of heating pads on which the animals can lie.These are generally made of a rigid glass-fibre material or of metal and they incorporate heating elements within them.The cable connections to them should be regularly inspected for scuffing or excessive wear and should be replaced if necessary by the service agent for the pads; it is not a do-it-yourself job.

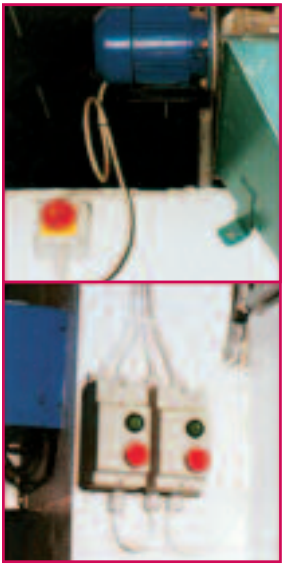
ELECTRIC MOTORS

Electric motors are used in a wide range of farm equipment and under a similar range of operating conditions. Regular inspection and cleaning is recommended where dirt and dust are likely to accumulate. As a general rule it is wise to use totally enclosed fan-ventilated motors for farming and horticulture.

Manufacturers of farm machinery usually select the motors for use in the equipment and these are selected with the appropriate degree of protection against dust and/or moisture. If, however, a motor is changed or fitted afterwards it should be of the totally enclosed type and of the correct rating. All motors, particularly three phase, should be protected from variations in voltage i.e. under/over and loss of voltage protection should always be fitted. Thermal and 'overload' protection adjustments should only be done by a person qualified to carry out such work.

Maintenance of motors is often neglected because they run with very little trouble; nevertheless a regular cleaning programme for both motors and control gear is needed. The accumulation of dust can lead to overheating and to fires. In general, regular cleaning will be repaid by fewer burnouts and by longer life. Cleaning should include using suction (rather than blowers) to remove dust, meal, etc.

When motors are used only seasonly there may be a risk of shafts rusting or bearing-grease hardening. To counteract this, such motors should be run for about 15 minutes every two-to-three months, especially if they are kept in damp conditions.



Safety Controls

If it is necessary to have a starter-and-stop switch remote from the motor, an additional isolating switch must also be installed close to the motor. This is particularly important with grain elevators and conveyors as well as for fans which are automatically controlled through remote panels or timeswitches.

Every motor should have a readily accessible control by which it can be quickly stopped. It should be on or near the motor and should be clearly marked to indicate which motor it controls.

Care in relation to overhead lines

Contact with overhead power lines causes serious and even fatal injuries each year. The majority of accidents occur through failure to notice the lines and to take sensible precautions. The widespread use of large farm machinery by farmers and their contractors has also increased the risk of such accidents.

ESB lines on steel lattice towers carry voltages of up to 400,000 volts; those carried on wooden poles may have voltages of up to 110,000 volts. The higher the voltage the greater is the clearance necessary for safety.

High-voltage overhead lines are invariably bare (i.e. without insulation). So, if contact is made by a slurry jet or water jet, a bale loader, a metal pipe, a ladder, fishing rod or hand tool, etc., there is a very high risk of fatal or severe shock.

Clearance and using machinery

DO be aware of the danger of making any contact – or even near contact – with overhead power lines.

DON'T erect stacks, clamps or buildings under or close to overhead lines.

DON'T move tall machinery or high loads under or in the vicinity of overhead lines until the clearances have been checked and are safe.

DON'T burn stubble or light fires under or close to ESB lines or poles.

DON'T assume that fallen overhead lines are dead; contact ESB immediately. NEVER try to remove a fallen tree from overhead lines.

DO be aware of the danger associated with trees growing into overhead lines; advise ESB if you feel that such trees may be hazardous.

DO take extreme care when moving large objects - ladders, slurry pipes etc. near overhead lines. In general, keep long items in a horizontal position when moving them.

NEVER touch or go near fallen wires.

VEHICLE ACCIDENTS

If a farm vehicle or its attachments comes into contact with a live overhead line (or underground cable) the greatest danger arises if someone makes contact with the vehicle and ground simultaneously. The driver will usually remain safe by staying INSIDE the cab; but is in great danger if attempting to climb down while the vehicle is in contact with a live line.

What to do!

Keep away from the vehicle and from anything attached to it; never touch it.

Call ESB as quickly as possible to disconnect the supply.

If the vehicle is not tangled in the line and is still operating, it can be carefully backed away until contact is broken. Similarly, a tipper or high lift attachment can be lowered or withdrawn.

If a driver must leave the vehicle then he/she must literally JUMP CLEAR so as not to touch the vehicle and the ground simultaneously. He/she must not go back to the vehicle, nor should anyone else approach it until it is confirmed and certain that the power has been fully disconnected.

In these situations you must never rely on the vehicle's rubber tyres or on rubber-soled boots to provide protection against electric shock.

See First Aid notes on pages 26/27

Electric Fences

The Control Unit (or Energiser)

Electric Fence energisers should comply with the Irish/European Standard – I.S./EN61011 series. Please look out for this when buying an energiser.

The energiser should be permanently fixed and wired and, when installed out of doors, should be controlled by a suitable double-pole switch mounted within clear view of the unit. When the energiser is located indoors it may be controlled by a plug and socket or a double-pole isolating switch. Never connect the energiser to a light-bulb adaptor.

The best place to locate the energiser is in a garage or workshop – away from livestock buildings. Because many energisers on sale are not protected against water-jets they should not be located in a dairy or milking parlour. It should not be installed in the vicinity of flammable material or where it is accessible to children or animals.

The energiser should never be mounted on electricity or telephone poles.

On many farms energisers are installed incorrectly and complaints arise about low output. It can also happen that shocks are felt on the metalwork of dairies and sheds if the energiser is not installed in accordance with the suppliers guidelines. Particular attention should be paid to the earthing systems (some energisers require multiple earth rods).

In general, the output earth terminal of an electric fence control unit is connected to an earth electrode (minimum diameter 9 mm), buried in the soil to a minimum depth of 500 mm (20"). Make sure that this earth system is positioned at least 10 metres (12 yards) away from ESB poles, from any part of the earthing of the main electricity system and from metal parts of buildings.

Connecting to the Energiser

The cables connecting the energiser to the fence and the energiser to its earth should be special electric-fence run out cable. This is highly insulated with a galvanised steel conductor. Ordinary domestic electric cable is not suitable as it does not have sufficient insulation for the high voltages involved.

The Fence Line

The following guidelines apply to both mains and battery operated electric fences.

Try to avoid erecting electric fences closer than 6 metres (20 feet) to overhead power lines.

When an electric fence wire has to be taken underneath an overhead line DO position it 1-2 meters from the pole and take it at right angles to the overhead line; avoid running it parallel to and under the line. Always mount it on its own supports – never support it on an ESB pole.

DON'T 'twitch' the fence wire when crossing beneath overhead lines, particularly when working it across undulating or sloping ground.

NEVER use barbed wire as a fence line – it is very dangerous – because it could trap a person or an animal.

Where an electric fence is erected near a public road, footpath or right-of-way it should be fitted with a suitable warning notice.

Irrigation and Spraying

Machinery for irrigation and spraying presents particular problems when used near overhead lines. Jets of water can conduct electricity and liquid slurry is an even better conductor. For these reasons the actual spraying device could become live if the liquid jets come into contact with overhead lines. These liquids can also cause short circuits or corrosion if they enter or coat electrical equipment.

Sprinklers

Care should be taken when laying out pipes for sprinklers. The pipes are normally of light aluminium and up to 10metres (33') long. Always carry them in a horizontal position and as close to the ground as possible. NEVER leave these pipes where the public or children can gain access.

Long boom irrigators

The boom is constructed of a large lattice framework mounted at its mid-point on wheels. The framework can have a span of more than 65 metres (200') and, when set-up for operation, be more than 5 metres (16') high. It is very dangerous to move any long boom under an overhead line. Routes should be agreed with ESB and marked on site if necessary.

Crop Spraying

Particular care must be taken when manoeuvring long-boom sprayers in the vicinity of overhead lines and particularly so on undulating ground.

Slurry and Muck spreading

Liquid manure is typically spread by tankers or applied by long-boom irrigators. Because liquid manure can conduct electricity more easily than water there is always a danger of electric shock if the jet of liquid makes contact with any electrical equipment. In addition, any spray which deposits solids of manure on electric lines and insulators can lead to a breakdown of insulation and/or flashovers.

While muck spreaders do not have the same 'throw' as a slurry spreader care should be taken so that muck is not deposited on transformers or other electrical equipment.

Rain Guns

The water jets from rain guns typically achieve a throw of 70 metres and a height of 15 metres. Wherever practicable a rain gun should travel parallel to an overhead power line rather than pass under it. If you are planning to use rain guns on land where there are overhead lines it would be advisable to contact your ESB office for advice on the safest procedure for your situation.

Safety and Agritourism

Many leisure activities are enjoyed on or near farmland whether as part of an agritourism activity or as individual hobbies. An awareness of the hazards associated with overhead lines will contribute to safer and more enjoyable activities. This section covers the more common outdoor leisure activities.

Fishing

Serious injury is possible if using carbon-fibre fishing rods near overhead power lines. These rods conduct electricity very well and, because of their length, they are particularly dangerous when used near overhead lines. Remember also, that electricity can "jump" gaps and the rod does not have to come into direct contact with the line to cause a lethal current to flow.

Because power lines may often be concealed by trees or shrubs in areas where fishing is popular the standard rule "Look Out, Look Up" should always be followed before starting to fish.

Camping

Farmers should not allow camping near overhead lines because tent poles, stays or guy ropes could come into contact with live conductors. Similarly, do not allow stays on poles to be used as washing lines.

Kites

Kites should never be flown near overhead lines for the same reasons. If a kite escapes and becomes entangled in an overhead line do not try to retrieve it and do not touch the kite string; notify the local ESB office to have it removed safely.

Sailing

Sailing boats and dinghies are often fitted with aluminium masts and, on most craft, metal wires are uses as stays. These can be very dangerous if they come close to overhead lines. Great care should be taken to avoid sailing under low powerlines and when transporting or manoeuvring craft on land. When storing boats or masts keep them well clear of overhead lines.

YOU AND YOUR CONTRACTOR

The legal responsibility on farmers to maintain a safe working environment is explained on Pages 24 and 25. It is important to remember that the safety of the electrical installation beyond the ESB meter is the responsibility of the farmer/householder. So is the way in which appliances and equipment are used and maintained .

In having electrical work done on the farm you should always insist it is carried out in accordance with the ETCI National Rules for Electrical Installations. These rules are very comprehensive. It is in your interest to ensure that the person you engage to carry out work is qualified to complete it to the required standards.


National Rules for Electrical Installations
Completion Certificate for Domestic & Small Commercial Installation
REGISTERED
ALL NEW WORK MUST BE CERTIFIED IN RESPECT OF CONSTRUCTION & TESTING
CERTIFICATION
ORIGINAL GREEN CERTIFICATE - CUSTOMER / WHITE COPY TO REGULATORY BODY / YELLOW COPY CONTRACTORS RECORD

For this reason you should always always use a registered electrical contractor for your electrical work.

When the job is complete you should ask the contractor for an ETCI Completion Certificate. This certificate is the contractor's guarantee to you that the installation has been completed in accordance with the ETCI Wiring Rules. The Certificate will also be required by ESB before it makes supply available to a new installation.

The Legal Obligation on Farmers to Provide a Safe Working Environment

Under the terms of the Safety, Health and Welfare at Work Act (1989) all employers have a legal duty to provide a reasonably safe working environment not only for their employees, but also to all others who may be affected thereby. The Act allows for severe penalties to be imposed on employers if they do not take due care to ensure that the workplaces under their control are safe.

A farm can be a very hazardous environment for working, with risk of injury from machinery, animals, harmful or poisonous gases and chemicals and from electricity.

Part VIII of Statutory Instrument (S.I.) No. 44 of 1993. (The Safety, Health and Welfare at Work [General Application] Regulations, 1993) details the legal requirements in relation to electricity. Among these requirements are:

35. Duties of Employer

It shall be the duty of every employer to carry on his work in accordance with the provisions of this Part and any relevant code of practice.

36. Suitability of Electrical Equipment and Installation

All electrical equipment and electrical installations shall, at all times, be so: -

(a) constructed

(b) installed

(c) maintained

(d) protected and

(e) used

so as to prevent danger.

37. *Adverse or Hazardous Environments*

Electrical equipment which may at any time be exposed to adverse or hazardous environments, including in particular: -

(a) mechanical damage;

(b) the effects of weather, natural hazards, temperature or pressure;

(c) the effects of wet, dirty, dusty or corrosive conditions;

(d) any flammable or explosive substance or atmosphere,

shall be constructed and installed or so protected as to prevent danger arising from such exposure.

42. *Connections*

Every electrical joint or connection shall be of adequate construction as regards conductance, insulation, mechanical strength and protection so as to prevent danger.

48. *Persons to be competent to prevent danger*

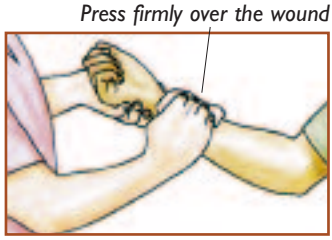
A person shall not be engaged in any work activity where technical knowledge and experience is necessary to prevent danger unless such person possesses such knowledge and experience or is under such a degree of supervision as is appropriate having regard to the nature of the work.

First Aid

Bleeding:

(Slight): Apply a dressing with a pad and bandage firmly in position.

(Severe): Apply direct pressure with fingers or if wound is large, press the sides of the wound firmly together. If no fracture, elevate the bleeding part. Apply dressing and pad and bandage firmly.



(Internal): The aim of First Aid is to obtain medical aid immediately and to combat shock,

(Nose Bleed): Sit patient with head slightly forward. Instruct casualty to breath through mouth. Warn not to blow nose. Pinch firmly the soft part of the nose. Loosen clothing about neck and chest. Seek medical attention if required.

Breathing:

If casualty is not breathing, waste no time, start Cardio Pulmonary Resuscitation (CPR) if you are competent to do this or be prepared to assist someone who can carry it out.

Burns and Scalds:

To relieve pain place the part under slowly running water or immerse in cool water. Remove promptly rings, bangles, etc. before the parts begin to swell. Cover the area with a dressing. Immobilise a badly burned limb. Do not apply any lotions, ointments or oil dressings. Do not break blisters.

Choking:

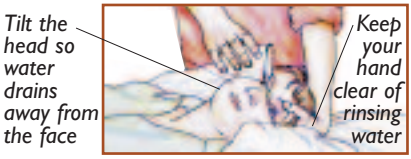
A choking person will not be able to speak and will have difficulty in breathing. A combination of sharp blows with the flat of your hand between the shoulder blades, or abdominal thrusts upwards below the casualty's ribs should dislodge the airway obstruction.

Electric Shock:

Do not touch casualty until the power has been switched off or the casualty removed from contact. Use only dry non-metallic material to pull the person clear. If no breathing and/or pulse commence CPR (see above 'Breathing'). If burns are present treat as described under burns. Always get medical help.

Eye Injury:

Do not rub. If no wound wash out with water. Remove the foreign body if possible. If serious, get medical help.



Fractures:

If it is a scull fracture, get medical help immediately. Do not move a fractured limb until it is supported. If leg, fasten to sound leg. If arm fasten to body. If elbow can be bent, use padding and sling or support with good arm. If elbow cannot be bent, bandage to body.

Heart Attack:

Make casualty comfortable. Put in sitting position. Give one aspirin to chew slowly. Reassure the casualty. Get medical help.

Poisons:

The aim of First Aid is to sustain life and remove the casualty urgently to hospital. If the casualty is conscious and the lips and mouth show signs of burns give quantities of water or milk to dilute the poison. Do not try to induce vomiting. If unconscious give nothing by mouth.

Shock:

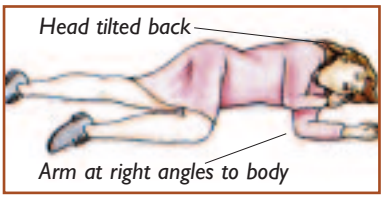
Keep the casualty warm and comfortable on their back with the head low and turning to one side, but do not overheat. Reassure constantly. Deal with the injury or underlying cause of the shock. Loosen tight clothing. Moisten lips with water but give nothing to drink. Remove casualty to hospital quickly.

Stings and Bites:

Remove sting if present and apply antihistamine cream or a solution of bread soda. If the sting is in the mouth, give a mouth wash of one teaspoonful of bread soda to a tumbler of water. Give the casualty ice to suck to minimise swelling. Seek medical aid immediately.

Unconsciousness:

The aim of First Aid is to ensure an open airway and to obtain urgent medical attention. The willing and untrained bystander is most helpless when confronted with an unconscious victim. If no breathing and/or pulse, do CPR. The simple act of turning such a victim on their side, in the recovery position so that they cannot drown in their own vomit, can save many lives.



Glossary and Electrical Terms

This section will help the reader to understand some commonly used electrical terms.

Bonding
The process of interconnecting all exposed metalwork to eliminate voltage differences (potential) between parts of the metalwork. It reduces the risk of electric shock and is particularly important in livestock buildings, milking parlours and in bathrooms, etc.

Capacitor (Condenser)
A device used to assist the starting of some single phase motors or used to prevent radio interference from electrical equipment.

Volt (V)
Electrical voltage or pressure (or potential). The normal mains voltage is 230V (single phase) and 400V (three phase).

High Voltage (HV)
More than 1000 volts. ESB distribution/transmission lines are 10,000 (10kV); 20,000 (20kV); 38,000 (38kV); 110,000 (110kV); 220,000 (220kV); 400,000 (400kV).

Low Voltage (LV)
Not more than 1000 volts, usually 230 and 400 volts.

Extra Low Voltage (ELV)
Not more than 25 volts.

Ampere (Amp or A)
The rate of flow of electrical current in a circuit.

Watt (W)
Electrical power or load. It is calculated by multiplying the voltage applied to a circuit by the current flow. i.e V x A = W. For example, a 230 v heater carrying a current of 5 Amps is rated at a power of 1150 watts (230 x 5).

Kilowatt (kW)
1000 watts; it is more commonly used for rating electrical appliances since the watt is a relatively small unit. A waterheater would typically have a load of 2.5 or 3 kW.

Kilowatt hour (kWh)

The unit of electrical energy (and the basis of measuring electrical consumption for billing purposes). A 1 kW appliance will use 1 kWh of electricity in one hour or 5 kWh in five hours. A kWh of electricity is commonly described as a unit of electricity.

Horsepower (hp)

One horsepower = 746 watts. The output of a machine in hp may be approximately converted from the kW rating by multiplying the kW rating by 1.33. For example, a 3.75kW machine has a hp of approx 5 hp (3.75 x 1.33 = 5) N.B. Because of internal losses the input power to a motor will always be slightly greater than its rated output.

Single phase

A 230 volt supply system having three wires; one live (or phase) one neutral and one earth. It is the usual supply for domestic premises and smaller farms.

Three phase

A 400/230 volt supply system having three live (or phase) wires, one neutral and one earth. It is used for larger motors and heavy appliances. The voltage between each of the live phases is 400 volts and that between a live phase and neutral 230 volts.

Transformer

A device for changing the voltage from one level to another, e.g, a pole-mounted transformer changing supply from 10,000 to 230 volts or a workshop one stepping voltage down from 230 to 110 for portable tools.

Alternating current (a.c.)

An electric current that reverses direction in cycles. 50 cycles per second is the standard in Ireland. The mains supply and the output from generators is a.c. unless it is rectified to produce Direct Current (d.c.).

Direct Current (d.c.)

A current that flows in one direction only. The electricity supplied from batteries is d.c. Rectifiers will convert a.c to d.c.

Fuses and MCBs (Miniature Circuit Breakers)

A fuse is a safety device which melts (blows) when it is overloaded - if, for example a fault develops in the wiring or in an appliance. In melting it cuts off the flow of electricity in that circuit. An MCB performs the same protective function but can be reset when the cause of the 'trip' is identified and repaired. MCBs are often referred to as 'automatic fuses'. MCBs protect circuits against overloading and are not to be confused with RCDs which offer a high level of protection against electric shock.

Residual Current Device (RCD)

In simple terms an RCD (formerly known as an earth leakage circuit breaker or ELCB) detects an abnormal leakage of electricity from a circuit, as would occur when a cable is damaged or when a fault develops on an appliance or portable electric tool (perhaps due to loose wire or presence of moisture). It responds almost instantaneously to such leakage and disconnects (or shuts-off) the supply from the circuit.

It is a legal requirement that a circuit supplying a socket outlet must be protected by a residual current device having a tripping current not exceeding 30 milliamperes (mA).

RCDs are supplied in a range of current carrying capacities and sensitivities. A high sensitivity 30 mA RCD gives the best level of protection and is required on socket circuits, water heaters and electric shower installations.

RCDs are usually fitted on the consumers distribution board. They are also available to fit at an existing socket outlet. Plug-tops incorporating an RCD are also available and are recommended for tools.

All RCDs have a test button to check that it is working correctly, both mechanically and electrically. This test button should be pressed at regular intervals, say once a month. Remember to reset the switch after testing.

It is strongly recommended that older electrical installations should have RCDs fitted.

THE MAIN CAUSES OF ACCIDENTS ON FARMS

These are the main causes of electrical accidents on farms:

- Insufficient knowledge of basic electrical safety
- Carelessness in the wiring and handling of plugs
- The use of worn, repaired or jointed flexible cables
- The use of portable appliances in outdoor conditions without suitable connections
- The use of domestic-type plugs, sockets, lightswitches, etc. for general farm installations
- Farmers themselves or "odd-job-men" carrying out electrical installations on farms, without the necessary technical skill

Outdoors

- Carelessness in handling loads or machinery close to overhead ESB lines
- Outdoor wiring and equipment not adequately installed for outdoor use

How does your farm rate when you check it out against these points?

Useful Addresses and Phone Contacts

ESB Networks
Supply Failure and Emergencies,
Reporting dangerous situations or damage to electricity networks.
Tel: 1850 372 999

New electricity connections, increased capacity, voltage enquiries, safety and technical queries.
Tel: 1850 372 757

Email address for queries:
esbnetworks@esb.ie

Website: www.esb.ie/esbnetworks

ESB's Website
www.esb.ie also provides useful information on electrical safety.

CER
Commission for Energy Regulation,
Plaza House, Belgard Road,
Tallaght, Dublin 24
Tel: (01) 4000 800

ECSSA
Electrical Contractors Safety and Standards Association
Coolmore, Park Road, Killarney.
Tel: (064) 37266

ETCI
Electro Technical Council of Ireland
Unit 43, Park West Business Park,
Dublin 12.
Tel: (01) 623 9901

RECI
Register of Electrical Contractors of Ireland
Unit K9, KCR Industrial Est,
Dublin 12.
Tel: (01) 492 9966

Please note your Electrical Contractor's Telephone No:

Please note your ESB Networks Emergency Telephone Number is 1850-372-999