

Trade of Electrician

Standards Based Apprenticeship

Installation in Special Locations

Phase 2

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COURSE NOTES

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Table of Contents

INTRODUCTION	4
SWITCHGEAR AND ELECTRICAL EQUIPMENT	4
IP RATINGS EXPLAINED	4
PLUGS AND SOCKETS IN SPECIAL LOCATIONS	6
LIGHTING FITTINGS IN SPECIAL LOCATIONS.....	6
ELECTRIC MOTORS IN SPECIAL LOCATIONS	6
SAFETY CONTROLS	6
INSTALLATIONS IN MILKING PARLOURS AND LIVESTOCK SHEDS.....	7
THE IMPORTANCE OF EQUIPOTENTIAL BONDING.....	7
SPECIAL LOCATION INSTALLATION REQUIREMENTS	7
UNIT RELATED ETCI RULES.....	8

Introduction

The working environment on farms is much more onerous than in a domestic situation, for that reason it requires a high 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 incorrect types 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, plug tops, light fittings, etc that must be used in these installations.

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

Switchgear and Electrical Equipment

The National Wiring Rules frequently refer to IP ratings for electrical equipment and fittings. For example a light fitting may be rated IP44 or the ETCI Wiring Rules may specify that in a particular location an electrical accessory should have an IP55 rating.

IP Ratings Explained

- The first number represents the degree of protection against the ingress of foreign solid bodies
- The second number represents the degree of protection against the ingress of liquids
- The additional letter represents the degree of protection against contact with hazardous parts within the enclosure.

Let us take for example, an item of electrical equipment with an IP44B Rating.

- The first numeral 4 means that the item is protected to level 4 (on a scale of 0 to 6) against solid foreign bodies.
- The second number 4 means that the item is protected to level 4 (this time on a scale of 0 to 8) against the entry of liquid.
- The additional letter B means that the item is protected against access with a finger to hazardous parts within the enclosure.

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, light switches, 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 e.g IP45.

In **dusty** locations - grain stores, etc. The **minimum** protection level against dust is increased to 5 for all electrical equipment e.g IP54.

The ETCI Wiring Rules may specify a rating of IPX5 or IP5X. In cases like these the position of the number indicates the predominant index of protection to which the installation/equipment must comply. The ETCI Wiring Rules contains the full IP table.

Plugs and Sockets in Special Locations

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 16Amp size will supply most portable tools whilst the larger 32Amp size should be used for electric welders etc. Plugs and sockets for use in areas likely to be hosed down must have a higher degree of protection against water (IPX5). Part 705 of the ETCI rules specify heights and locations.

Lighting Fittings in Special Locations.

The range of light fittings used on farms will generally vary from large outdoor lights using mercury vapour, sodium vapour, tungsten halogen to standard fluorescent in livestock sheds and milking parlours. Compact fluorescent and ordinary tungsten bulbs **in enclosures** are also widely used.

All light fittings should be chosen to match the working environments and to comply with the IP ratings in relation to water and dust proofing. Pendant fittings or battenholders are **not suitable**.

The atmosphere in livestock and poultry sheds can be very corrosive on metal and so special light fittings which are anti corrosive are recommended for use in these situations.

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 ingress. 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 light fittings with polycarbonate diffusers (covers) are selected as they are better able to withstand impact damage.

Electric Motors in Special Locations.

Electric motors are used in a wide range of farm equipment under potentially hazardous operating conditions.

Manufacturers of farm machinery, select motors which have the appropriate degree of protection against dust and / or moisture. However, if a motor has to be changed, it should be of the correct type and rating.

Safety Controls

If it is necessary to have the start / stop control fitted remotely from the motor, an additional isolating switch **must** also be installed in close proximity to the motor. This is particularly important with grain elevators and conveyors as well as fans that are automatically controlled through remote panels or timeswitches.

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

Installations in Milking Parlours and Livestock Sheds

The Importance of Equipotential Bonding.

Because cattle are more sensitive to electric shock than humans, it is crucially important to minimise voltage differences that can occur between metal components and earth, in locations such as milking parlours and livestock sheds. This is achieved by **equipotential bonding**, which means that every part of the exposed metalwork is electrically bonded together and then connected to earth. Equipotential bonding ensures that there are no potentially dangerous voltage differences present which would cause electric shock.

In order to keep within a safe value of “touch voltage”, the earthing and bonding system must be adequately designed and installed. It should be noted that, apart from danger to life, quite low voltages can reduce milk quality, production and cause mastitis in cows.

Detailed information and specifications regarding milking parlours and livestock sheds are contained in the ETCI Rules.

Special Location Installation Requirements.

- All wiring cables must be a suitable size for the load.
- All cables must be securely fixed, clipped and tidy.
- All underground cables must be buried in accordance with the ETCI rules and mechanically protected where necessary.
- Where underground cables emerge from the ground they should be fixed to the walls of buildings and should be mechanically protected for **1.25 metres** above ground level.
- All overhead cables must be at least 6 metres above ground level.
- Glands having the appropriate IP ratings must be used on all cables, especially on armoured cables.
- All cables which are at risk from attack by vermin, or damage by farm animals or machinery, must be suitably protected.

Examples of suitable protection are as follows:

- (1) Plastic (PVC) conduit (heavy duty).
- (2) Armoured cable.
- (3) Braided flexible cable.

- If possible motor starters should be located with a clear view of the motor position and easily accessible. If this is not possible a local isolator should be installed adjacent to the motor.
- Each starter must have its own isolating switch.
- All switch gear must be mounted on non flammable surfaces.
- IP44 is the minimum rating for all electrical equipment including light fittings.

Unit Related ETCI Rules.

Special Note

- Part 705 deals specifically with agricultural and horticultural premises
- The requirements of Part 705 supplement, modify or replace the general requirements of the other parts of the ETCI Rules
- In areas not covered by Part 705 the general ETCI Rules will apply
- The number following the number 705 e.g. 705.554 (plugs, socket outlets etc.) are those of the corresponding parts of the general ETCI Rules
- The final digits e.g. 705.554.01 indicate additional requirements

Listed below are the Sections, Annexes and the Table contained within the ETCI Rules which refer to installations in special locations.

Agricultural and Horticultural Premises	705 705.11
Definitions	705.2
Types of Distribution System	705.312 all
Maintenance	705.34
Protection against Electric shock	705.41 701.411.3 all
Protection against Fire	705.42 705.421, 705.421.01
Common Rules and External Influences	705.51 705.512 all 705.514 all
Wiring Systems	705.52 all
Isolation and Switching	705.53 all
Earthing and Bonding	705.54 all
Other Equipment	705.55 705.554 all 705.555, 705.555.01 705.559, 705.559.01, 705.559.02
Tables	52B
Annex	705A