University of Kent

ESTATES DEPARTMENT

Low Voltage Electrical Safety Rules

Rev 2

Document History

Document Revision	Date	Description of amendments	Revision Author
1	19/10/2017	Procedure developed by Matt Cheney and issued as a departmental procedural document in replacement of the previously titled 'Permit to Work Procedure'.	MC
2	18/12/2018	Annual document review. Update section 1.2 responsibilities. Update EMM to AP throughout.	MC
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SECTION 1

Estates Low Voltage Electrical Safety Rules

1.1 Introduction

This procedure has been developed as part of a suite of SSoW processes for the Estates Department. The person with overall responsibility for controlling and updating these procedures is the Assistant Director of Estates (Maintenance & Compliance).

These rules are Mandatory in order to establish safe working practices for the protection of persons under the management of Estates whose activities involve work on low voltage electrical systems and equipment on University of Kent sites and premises.

Low voltage is defined as:
Voltage in the range of
50–1000 V AC or 120–1500 V DC (between conductors)
50- 600V AC or 120- 900V DC (conductor to earth)

The rules govern work associated with University of Kent's electrical systems and equipment, and apply to both Estates employees and those contractors and suppliers engaged by University of Kent, directly or via third parties, to work on its sites and premises.

All persons who are, or who may be, concerned with the installation, control, operation and / or maintenance of any electrical equipment shall comply with the University of Kent electrical safety rules, which observe the following statutory provisions:

- The Electricity at Work Regulations 1989
- The Electricity Supply Regulations 1988
- The Health and Safety at Work Act 1974 and subordinate legislation;
- The Management of Health and Safety at Work Regulations 1999

These persons must also comply with the requirements of BS7671 – Requirements for Electrical Installations and Testing.

Note: Any work undertaken may also be governed by University of Kent Policies and safety rules other than those for electrical safety, such as those applying to general occupational health and safety matters and not least the requirement that work activities are subjected to risk assessment and method statement.

1.2 Responsibilities and Competency

Assistant Director (Maintenance & Compliance) is the Duty Holder, who is the person responsible for controlling Electrical Low voltage activities and updating and maintaining these procedures.

Estates Maintenance Manager (EMM) - A person who fulfils the requirements of a Competent Person is over 21 years of age, who is principally of an engineering discipline or who has significant experience and who has had adequate training to work without danger and accepts responsibility for the safety of others working under his direction.

Estates Project Manager (EPM) - A person who fulfils the requirements of a Competent Person is over 21 years of age, who is principally of an engineering discipline or who has significant experience and who has had adequate training to work without danger and accepts responsibility for the safety of others working under his direction.

Both the EMM and the EPM will be considered Authorised Persons (AP) following written authority by the Duty Holder.

Apart from EMM and EPM other positions may also be classified as Authorised Persons (AP) and shall receive written authority from the Duty Holder.

Authorised persons shall hold recognised formal qualifications beyond their experience with a minimum of City & Guilds or equivalent. Where formal City & Guilds type qualifications have not been attained a recognised ONC, HNC, HND or Degree relevant to the AP activity will satisfy this requirement.

Competent Person (CP) - A person who is essentially of an electrical discipline and has adequate technical knowledge and experience of the system or equipment to be worked on to avoid danger to himself or others for whom he may be responsible.

The EMM, the Electrical Trades Foreman/supervisors and Charge Hand at the University of Kent are deemed Competent Persons by reason of qualifications and experience.

The Electricians employed by the University of Kent or by external contractors are deemed to be competent persons by reason of training and experience.

1.3 Safe Working Procedures

In the event of a safe working procedure being required for work on a specific item of equipment it is the responsibility of the Authorised Person (AP) to ensure this is in place.

1.4 Failure of Supply

During failures of supply, all plant is to be regarded as being live until isolated and proven dead.

1.5 Dangerous Occurrences or Accidents

All dangerous occurrences and accidents shall be immediately reported to line management, to the Health and Safety Advisor and to the AP

1.6 Operational Restrictions

Operational restrictions identified from any source are to be registered with the AP. These may include, but may not be limited to:

- Health & Safety Executive (HSE) safety alerts
- Manufacturer's product safety alerts
- Failures of electrical equipment during operation
- Third party reports or other safety alerts

1.7 Objection to Instructions

If a person has an objection on safety grounds to instructions received for work on, or the operation of, electrical plant, he/she shall make their objection known to their line manager. The manager shall consider the matter immediately, referring to the AP if the matter cannot be otherwise resolved.

1.8 Unauthorised Electrical Equipment

All (portable) electrical equipment brought onto University of Kent sites or premises that is operated by being connected into the mains supply must be PAT tested and comply with the requirements of the Low Voltage Safety Rules. It is the responsibility of the AP and line management to ensure that any electrical equipment found to be non-compliant is safely disabled, removed from site or made safe.

1.9 Signs and Screens

Responsibility for placing in position or moving any signs or screens required in connection with the issuing of written work authorisation documents rests with the AP/Competent Person (CP).

SECTION 2

Work On Low Voltage Systems

2.1 General

For UoK installations Low Voltage refers to systems and equipment working at ranges identified under SECTION 1.1 of this procedure. When written authorisation is required by the rules, it is the duty of the AP to ensure the following:

All the necessary steps to ensure safety and to avoid danger are implemented; The CP in charge of the work, and any persons for whom he is responsible, are fully conversant with

- the nature and extent of the work to be done;
- the area in which it is safe to work;
- their own responsibilities for safety; and
- the safety precautions in force.

2.2 Permit to Work

A Permit to work or test may use additional sheets so long as this is clearly referenced on the permit. These sheets may use diagrams or sketches to support the permit as required.

Each permit will be uniquely numbered where that number can only be used for one permit.

A Permit to Work (PTW) can only be issued by an AP. This is not normally required for work on LV equipment or systems except as noted in these rules. The exception to this is if the AP considers the complexity of a system to justify its issue. There can only ever be one PTW for any given work task at any one time.

Where the LV electrical system can be 'back fed' from another substation in the UoK distribution network, a permit to work issued by the AP shall be obtained before proceeding. If systems have more than one source of supply the AP must issue a permit.

2.3 Associated Permits

Other forms of permit or authorisation to work may be required, e.g. Confined Spaces, Hot Works. This should be particularly observed when the re-commissioning of plant is proposed. All relevant permits must be cancelled prior to re-commissioning.

2.4 Competency

UoK Estates management is to ensure that any person carrying out work on LV equipment is competent.

Where equipment is deemed to require a PTW it is the responsibility of the AP to ensure the person is competent to receive a PTW and carry out the specified work.

2.5 Isolation and Earthing

No work of any description (including maintenance, repairs and cleaning) is to be carried out on any low voltage (LV) equipment unless it:

- is barriered from adjacent equipment where necessary to prevent danger;
- is made dead (prove dead) and is securely isolated from all points of supply to the equipment; where necessary is earthed.
- is locked at all points of isolation;
- has approved safety signs displayed;
- has been made safe by inhibiting the automatic sequence of any automatic fire suppression equipment;
- is released for work by the issue of a work permit at the discretion of the AP.

All work shall be proved dead using a recognised tester and proving units which have undergone calibration.

The use of dedicated Lock-out padlocks with one key shall be used to lock out electrical equipment and used in conjunction with suitable lock-out equipment where required such as MCB devices or valve covers.

2.6 Live Working

No work of any kind shall be carried out on LV equipment when the equipment is live if the purpose of the work can be achieved with the power isolated.
If it is not possible to complete the work without energising the equipment, this will only be permitted if an AP has issued a PTW which will identify all risks and all measures to be taken to minimise the potential danger.

2.7 Live Testing

Apart from Inspection and testing as defined in Part 7 of BS7671, live testing is permitted only in the following circumstances:

The use of approved equipment for the purpose of voltage detection on a live circuit, but only where it is a necessary part of the test involved. In such circumstances the test equipment used should comply with HSE Guidance Note GS38 – Electrical Test Equipment for use by Electricians, and adequate precautions are to be taken to avoid access to the equipment under test by persons not involved with the testing.

Any test or inspection procedure, other than voltage detection on a live circuit, which is necessary to be undertaken live. The test or procedure is to be specifically authorised by an AP. The AP authorizing such live testing must attend and remain present for the duration of the operation. In no circumstances may an AP authorise himself to do such tests.

The AP shall not authorise live testing or inspection procedures unless he is satisfied that: the requirements of Regulation 14 of the Electricity at Work Regulations are satisfied; it is unreasonable for the testing to be undertaken dead; the person who will undertake the work is competent and properly equipped to carry it out safely and accepts the PTW/test.

Where live testing or inspection procedures are carried out in a workshop, or on an electrician's bench, portable or fixed barriers must be used to exclude those not involved in the test together with the display of safety signs, stating live testing is in progress. In such circumstances the mains supply used for testing purposes must be protected by a maximum 30 mA residual current device (RCD).

Protective covers over live parts of equipment must be replaced as soon as the necessary test is completed. Equipment with exposed live parts must not be left unattended unless it is located in a locked room to which only the person in control of the test has access. In such circumstances warning signs must be displayed.

A PTW is required if LV equipment is to be energised to allow completion of the task before all "full-time" safety provisions are implemented.

A PTW is required if LV equipment is to be pressure tested at a value of applied voltage in excess of low voltage in the installed working location. This restriction does not apply to approved test instruments.

2.8 Re-commissioning

No LV equipment is to be re-commissioned or energised after the completion of work until the following apply:

- The equipment is visually checked to ensure that all removable covers have been replaced;
- All persons, resources and tools employed in the work area are withdrawn and accounted for;
- All earthing devices (where applicable), barriers and safety signs are removed;
- The correct testing procedures have been carried out; It is released for service by the cancellation of any PTW;
- The automatic control of any fire suppression equipment such as Halogen gas is reinstated.

SECTION 3

Precautions for Work on Electrical Equipment

3.1 Cables

Before commencing any work involving the cutting into any LV cable, the cable must be positively identified by the AP and the necessary safety precautions implemented at each cable end. All cables that cannot be readily and positively identified must be spiked under the direct supervision of an AP.

An approved spiking gun must be used for this purpose by a person specifically trained in its use.

All other cables in the vicinity must be assumed to be live and marked with the approved safety signs.

3.2 Batteries

Where a cell is to be replaced in a bank of batteries this is effectively live work. This must be carried out under a PTW with suitable PPE, and not done as lone working. The ends of the battery bank must be isolated from all sources of supply before starting work.

3.3 Rotating Machines

Before any electrical work is carried out: The machine is to be stationary. The machine is to be securely isolated from all electrical and mechanical driving forces. Isolate, by the means provided, any heater elements or other sub-circuits normally energised when the machine is stationary. Give particular attention to the isolation of the auxiliary circuits, controlling the automatic start sequence of the prime mover, of any standby generation equipment liable to be automatically set in motion.

3.4 Capacitors

Equipment which has an associated capacitor fitted is to be subject to special caution. After isolation of the equipment, wait for the period shown on the label attached to the equipment to allow the integral bleed resistors in the capacitor to dissipate any trapped charge. After the specified waiting time the earth connection can be applied to the equipment.

Where the capacitor is connected to the equipment via external fuses, a voltage check using an approved voltage indicator must be made on both sides of the fuse. Any trapped charge is to be dissipated by application of

an approved discharge resistance of a suitable voltage rating, resistance and thermal capacity. Under no circumstances is the trapped charge on any capacitor to be discharged directly to earth.

Where no label is attached to the equipment, a minimum waiting period of 5 minutes applies. After this period the same precautions as for an externally fused capacitor are to be applied before applying the earth connection to the capacitor.

3.5 Control and Auxiliary Circuit Supplies

It shall not be assumed that the isolation of the main supply to any equipment also isolates the control and auxiliary circuits' supplies of that equipment. Before any work is carried out on any equipment the CP shall ensure the following:

- Where necessary to avoid danger, the control and auxiliary circuits of any automatic equipment are disconnected.
- All voltage transformers associated with the equipment are isolated, withdrawn and locked out where possible.
- The fuses are withdrawn or miniature circuit breaker (MCB) is open on the low voltage side of all voltage transformers to prevent any possibility of such transformers being energised from the low voltage side.
- Precautions shall be taken against inadvertent replacement of any fuses or re-closing of circuit breakers.

3.6 Prohibition

It is expressly forbidden to adopt any practice involving the making live or dead of any equipment that could cause electrical or mechanical danger by means of a signal, by telephonic or electronic means or by a prearranged understanding implemented after an agreed interval of time.

3.7 Errors or Deficiencies

During the course of work on any electrical equipment, errors or deficiencies identified are to be brought to the attention of line management without delay.

3.8 Record Drawings and Other Engineering Data

The responsible person is required to ensure that all record drawings and data necessary to ensure safety, both generally and under these safety rules, is available as and when it is required. Further, all such drawings and records are to be kept up to date.