

Health and Safety during Electrical Works

Last October the health and safety during electrical works was brought into discussion when the fatal accident happened at Balfour Beatty construction site. Martin Walton died when he came into contact with live terminals of a unit at Morgan Stanley's Heathrow Data Centre. According to the Health and Safety Executive (HSE) Mr Walton's death was caused by a failure in the management of health and safety.



Electricity is the potential hazard for every contractor, and there are certain rules which can reduce the risk of electrical injury and damage. It is necessary that all electrical hazards and precautions are taken into account during the risk assessment and management of the building site. The risk should be properly assessed, work planned and managed to prevent workers from electrocuted.

Firstly it is essential to determine the safe working procedures:

1. Identify the circuit or equipment to be worked on or near and the work to be done
2. Deciding whether to work dead or live
3. Apply dead working or live working procedures

This three conditions must be met to carry on work on or nearby live conductors. **Dead working** is a normal procedure while carrying on work on electrical equipment and circuits in most cases. **Live working** should be permitted only when it is unreasonable to work dead (cases of faults, testing).

The electrical hazards are greater while working near or on live conductors. Many accidents to electricians or other tradesmen occur when they are working on equipment that could have been isolated. It is advised to plan the work so all jobs can be performed on dead equipment. Electricians can fall victim to electrocution if they fail to carry out safe working practices. HSE advises that the following three conditions must be met for live working to be permitted where danger may arise (refer to HSG85 guidance). If just one of these conditions cannot be met, live working must not be permitted and dead working is essential.

According to HSE, the conditions are:

- it is unreasonable in all the circumstances for the conductor to be dead;
- it is reasonable in all the circumstances for the person to be at work on or near that conductor while it is live;
- suitable precautions (including, where necessary, the provision of personal protective equipment) have been taken to prevent injury.

In some circumstances it is impossible to make equipment dead, for instance:

- in case of control which requires to energised a cabinet at some time with parts live (but not exposed);
- in case of fault-finding procedures which may not be technically feasible to monitor the operation and performance of a control system or to trace a malfunction of such equipment with it dead
- when a distribution network operator (DNO) needs to connect a new low-voltage service to an existing



main, but it might be unreasonable to disconnect many customers.

- when switching off a system, such as the supply to an electric railway track, to carry out maintenance or repair work may cause disproportionate disruption and cost.

The regulations require that adequate precautions are taken while working dead so that the equipment will not get energised again- the process of isolation by using an adjacent local isolation device such as a plug and socket-outlet, fused connection unit, switch-disconnector, circuit-breaker, fuse, etc. When isolating the primary source of energy, it is also essential to isolate anecondary sources (such as standby generators, uninterruptible power supplies and microgenerators). Isolation can be :

- by using a main switch or distribution board switch-disconnector
- by isolation of individual circuits
- by isolation of individual circuits protected by circuits- breakers
- by isolation of individual circuits protected by fuses
- by temporary disconnection of incoming supply

Please note that using an insulating tape over

a circuit-breaker to keep it in the OFF position and prevent switch-on is not acceptable will not achieve compliance with the Electricity at Work Regulations 1989.

The necessary caution notes should be applied at the points of insulation. Equally important is that employers ensure that all workers are competent. The procedure for proving dead should be by use of a proprietary test lamp or two-pole voltage detector as recommended in HSE Guidance Note GS38, Electrical test equipment for use by electricians.

Risk assessment is required if work has to be executed on live conductors to identify and apply appropriate measures of control. It is advised to also ask employees about the possible hazards, as they may notice things that are not obvious. Having identified the risks arising from the live work, it is necessary to decide how likely decide how likely it is that harm will occur and the severity of the injury that might occur. All findings should be recorded and if there are more than five employees law requires to write it down. The risk assessment should inform managers and supervisors whether it is reasonable in all the circumstances to work live.

Providing the above requirements have been

met, live working can be executed if suitable precautions are taken to prevent injury arising from the hazards identified in the risk assessment. The precautions should have been determined during the evaluation of risk and might include:

- installing temporary insulation, protective enclosures, or screens to prevent parts at different potentials being touched at the same time;
- using temporary barriers with warning notices affixed to keep unauthorised people away from the work area;
- ensuring that adequate clearances are established and maintained when working near to live equipment
- making sure that workers understand the task and the system to be worked on (clarity of instructions is essential) are trained and experienced and follow the correct procedures. They must be competent to realise their limitations and know when to seek help;
- providing lighting and working space that is adequate and free from trip hazards
- using robust and properly insulated tools;
- using test instruments with insulated probes and fused leads

- maintaining tools and test equipment in good condition and replacing them if damaged;
- storing tools correctly – horizontal surfaces and projections inside control cabinets should not be used – and ensuring that objects such as tools and bolts cannot fall onto exposed live parts;
- avoiding lone live working. Quick action is needed in the event of an electric shock to disconnect the supply and give assistance, so it will usually be necessary to be accompanied by someone who is competent to make the system safe and avoid injury;
- providing and using correct personal protective equipment (PPE) to reduce the risk of contact with live parts or earth, e.g., insulating gloves, insulating matting. If there is a risk of burns from arcing or flashover that cannot be avoided, consider the use of adequately rated, thermally insulating, flame-resistant PPE (including face/eye protection). PPE should frequently be inspected and replaced if damaged.

DEAD Working Procedures

1. Identify the circuit or equipment to be worked on (Reg 4)
2. Cut off supply, isolate and secure isolation (Reg 12)
3. Retain keys. Post 'caution' and 'danger' notices (Reg 12,13)
4. Prove circuit or equipment dead (Reg 13)
5. Apply circuit main earth(s) where necessary (Reg 13)
6. Take precautions against adjacent live parts where necessary (Reg 14,15)
7. Issue permit-to-work where necessary (Reg 13)
8. Apply local earth(s) where necessary (Reg 13)

An electrical permit-to-work is a statement that a circuit or item of equipment is safe to work on – it has been isolated and, where appropriate, earthed. You must never issue an electrical permit-to-work for work on equipment that is still live or to authorise live work. It should state which equipment etc has been made safe, the steps by which this safety has been achieved, and exactly what work is to be done.

LIVE Working Procedures

1. Identify the circuit or equipment to be worked on or near the work to be done (Reg 4)
2. Ensure suitable precautions are taken and that suitable protective equipment is used (Reg 4(4) 14(c))
3. Ensure adequate working space, access and lighting. Restrict access to area of live work (Reg 14,15)
4. Ensure accompaniment is provided if necessary. Accompaniment to be trained to give assistance (Reg 3,4,16)
5. LIVE WORKING, i.e. INJURY TO BE PREVENTED

Safe insulation procedures are required on both low voltage and high voltage installations to minimise the electricity hazards. Additional extra precautions should be taken while working with HV installations.

ESQCR - Electricity Safety, Quality and Continuity Regulations

Electricity Safety, Quality and Continuity Regulations 2002 requires duty holders to report incidents which involve domestic fatalities, supply interruptions and safety of others.

Reports should be done by generators, transmission operators, distributed network operators, suppliers and meter operators. The report should be done by the duty holders only and can be done online. There are few categories under which reports can be submitted, like for instance, injury, supply interruptions, domestic fatalities or other (including fire and explosion). Fatal and major injuries can be reported online on 0345 300 9923

Electrical work is covered by the Building Regulations in England and Wales, and throughout the

UK it is also covered by what are titled the IET Wiring Regulations (BS 7671). Compliance with the Wiring Regulations is the accepted way to satisfy electrical safety legislation. While Building Regulations Part P (electrical safety) is the most commonly referenced regulation it is important to note that electrical work must comply with all relevant parts of the Building Regulations. Here are examples of other parts of the Building Regulations that contain requirements with regards to electrical installations:

- Part A (Structure): depth of chases in walls, and size of holes and notches in floor and roof joists
- Part B (Fire safety): fire safety of certain electrical installations; provision of fire alarm and fire detection systems; fire resistance of service penetrations through floors, walls and ceilings
- Part C (Site preparation and resistance to contaminants and moisture): resistance of service penetrations to rainwater and contaminants such as radon
- Part E (Resistance to the passage of sound): soundproofing of service penetrations
- Part F (Ventilation): dwelling ventilation rates
- Part L (Conservation of fuel and power): energy efficient lighting
- Part M (Access to and use of buildings): height of socket-outlets and switches

Building Regulations details vary in many regions of the United Kingdom

This article is an introduction into the subject, please refer to HSE and Building Regulations for detailed information.

(Source: HSE)

