Site Safety Management

It is essential from the outset that effective management and control of the system, apparatus and equipment used on site is achieved and maintained, thereby ensuring that the hazards and risks which can arise are minimised.

An authorised person should be appointed, with responsibility for the supervision of the installation of switchgear, equipment, cables, jointing, etc. throughout the contract. The authorised person should also have responsibility for the safe working practices of the operatives, as well the control of appointed sub-contractors; sub-contractors must provide appropriate method statements and risk assessments for their works.

The authorised person may delegate (in writing) his authority in total or for specific tasks and procedures to competent persons having appropriate training and competence in the performance of these tasks and procedures.

Once switch-rooms and risers are made available by the main contractor for the services installation to proceed, and before installation of equipment commences, it should be ensured that suitable doors are fitted to all switch-rooms and riser entrances and that heavy duty locks, or padlocks, and keys are provided. Also ensure that access doors are locked when not working in these areas. Plant and materials should not be stored in electrical switch-rooms or electrical risers.

Always try to avoid energising any outgoing electrical distribution services until the distribution switchgear and all connected circuits are complete and have been inspected and tested. If live services are required by others, distribution boards and circuits should only be energised following a written request from the main contractor or agent and with the agreement of the authorised person for the installation. Once distribution services are energised, where necessary implement the safe isolation procedures explained in the rest of this brochure.

Before energising any final circuit (i.e. lighting, power, etc.) it should be checked that the wiring system within the area has been completed and equipment, including luminaries and accessories, fitted. This check should ensure that earthing arrangements and protective conductors including equipotential bonding are in place, and that the final circuit is tested as far as possible.

If the service in question is energised for the testing and commissioning of equipment/system, it must be switched OFF and locked upon completion of this work, unless stated otherwise on the written instruction and agreed with the authorised person.

When live services are provided prior to final commissioning, warning signs should be displayed on each item of live switchgear, plant and along cable routes that pass through the work areas in exposed positions. This is particularly important where switchgear and cables are exposed to damage that may be caused by other trades or the environmental conditions.

Persons or trades entering completed and energised areas, working under instructions from the main contractor or client agent, must be made aware of the extent of the live services within the respective areas by the electrical contractor, main contractor or client agent.
Safe Isolation Procedure

For work on LV electrical equipment or circuits, it is important to ensure that the correct point of isolation is identified, an appropriate means of isolation is used and the supply cannot inadvertently be reinstated while the work is in progress. Caution notices should also be applied at the point(s) of isolation, and the conductors must be proved to be dead at the point of work before they are touched.

A fundamental principle is that the point of isolation should be under the control of the person who is carrying out the work on the isolated conductors.

The means of isolation can be an adjacent local isolation device such as a plug and socket, switch-disconnector, circuit breaker, fuse etc, as appropriate, which is under the direct control of the competent person carrying out the work. These devices can be used without further precautions provided there is no foreseeable risk that the supply could be reinstated by others.

When there is no such local means of isolation or there is a risk of reinstatement of the supply as above, the circuit or equipment to be worked on should be securely isolated by one of the following methods.

Isolation using a main switch or distribution board (DB) switch-disconnector

Isolation of equipment or circuits using the main switch or DB switch-disconnector is the preferred method. The point of isolation should be locked off using a unique key or combination retained by the person carrying out the work. In the case of multiple isolations on a DB, a multi-lock hasp can be used to prevent access to a main isolator until such time that all persons working on a system have completed their work and removed their padlocks from the hasp.

If locking-off facilities are not provided on the relevant switch then a locked DB door or locked switch-room door is acceptable provided the key or combination is unique, and is retained by the person doing the work. Again, multi-lock hasps can be used to control multiple isolations, although a key box or similar system may be needed to retain and control access to the main door key.

Where it is intended that more than one person will be working on circuits supplied from a DB, (i.e. multiple isolations) and a multi-lock hasp cannot be used to secure the main point of isolation, individual isolation of each circuit by one or more of the methods shown below is recommended, to prevent inadvertent reinstatement of the supply. The principle is that each person carrying out such work should have control of their own point(s) of isolation and not rely on others to prevent inadvertent energisation.

Isolation of individual circuits

Where it is not practical to isolate a distribution board, individual circuits supplied from it can be isolated by one of the methods described below, depending on the type of protective device used. However, bear in mind the overriding advice to avoid energising any outgoing electrical distribution services, preferably until the distribution switchgear and all connected circuits are complete and have been inspected and the relevant tests carried out.
Safe Isolation Procedure

Note
Some DBs are manufactured with ‘Slider Switches’ to disconnect the circuit from the live side of the circuit breaker. These devices should not be relied upon as the only means of isolation for circuits as the wrong switch could easily be operated on completion of the work.

ii. Isolation of individual circuits protected by fuses
Where fuses are used, the simple removal of the fuse is an acceptable means of disconnection. Where removal of the fuse exposes live terminals that can be touched, the incoming supply to the fuse will need to be isolated. To prevent the fuse being replaced by others, the fuse should be retained by the person carrying out the work, and a lockable fuse insert with a padlock should be fitted as above. A caution notice should also be used to deter inadvertent replacement of a spare fuse. In addition, it is recommended that the enclosure is locked to prevent access as stated above under ‘Isolation using a main switch or distribution board (DB) switch-disconnector’.

Note
In TT systems, the incoming neutral conductor cannot reliably be regarded as being at earth potential. This means that for TT supplies, a multi-pole switching device which disconnects the phase and neutral conductors must be used as the means of isolation. For similar reasons, in IT systems all poles of the supply must be disconnected. Single pole isolation in these circumstances is not acceptable.

Electrical Permits-to-Work
An electrical permit-to-work must be used for work on HV systems that have been made dead, and can be useful in certain situations for LV work. These permits are primarily a statement that a circuit or item of equipment is isolated and safe to work on. They must not be used for live working as this can cause confusion. Details on the use of these permits, including an example form, are given in HSG85.

Caution Notices
In all instances where there is a foreseeable risk that the supply could be reinstated as above, an appropriate “caution” notice should be placed at the point of isolation. For DBs with ‘multiple isolations’ a single suitably worded notice on each DB, such as the example shown below, would suffice:

CAUTION: THIS DISTRIBUTION BOARD HAS A NUMBER OF CIRCUITS THAT ARE SEPARATELY ISOLATED. CARE SHOULD BE TAKEN WHEN REINSTATING THE SUPPLY TO AN INDIVIDUAL CIRCUIT THAT IT HAS BEEN CORRECTLY IDENTIFIED.
Proving Dead Isolated Equipment or Circuits

Following isolation of equipment or circuits and before starting work it should be proved that the parts to be worked on and those nearby, are dead. It should never be assumed that equipment is dead because a particular isolation device has been placed in the off position.

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. Non-contact voltage indicators (voltage sticks) and multi-meters should not be used. The test instrument should be proved to be working on a known live source or proprietary proving unit before and after use. All phases of the supply and the neutral should be tested and proved dead.

Additional Precautions

New installations
New installations can be a particular hazard as some of the circuits or equipment may require to be modified after the installation has been energised. It is therefore important that every protective device is correctly identified at each distribution board before any energising takes place, and safe isolation procedures, such as locking-off circuit breakers as described above, are adopted, particularly where a number of electricians are working on the same installation.

The practice of placing PVC insulating tape over a circuit breaker to prevent inadvertent switch-on is not a safe means of isolation.

Neutral conductors
Care should be taken when working on neutral conductors of circuits. The practice of ‘borrowing’ neutrals, i.e. making use of the neutral of one circuit for use on another circuit, is not permitted by BS 7671. This dangerous practice, however, is not uncommon. Lighting and control circuits are the most common examples where this practice is found. In these circumstances the neutral conductor can become live when the conductor is disconnected, if a load is connected to that circuit.

It is also difficult to identify specific neutral conductors in ‘bunches’ of single core cables, e.g. where enclosed in trunking or conduit, and care should be taken when severing such cables that the correct conductor has been identified. If doubt exists, live working measures, such as the use of eye protection, electricians insulating gloves, insulated tools etc, should be employed until the circuit has been proved dead.
**Proving dead unused or unidentified cables**

Where there is uncertainty regarding isolation when removing unidentified cables or proving dead an ‘unused’ cable, particularly where insufficient conductor is exposed to enable the use of test probes, those conductors should be assumed to be live until positively proven to be dead and any work carried out on them should employ live working practices until the conductors are proved dead.

Clamp meters can be used as a means of identifying cables by testing for current flow in the conductors. Non-contact voltage indicators (voltage sticks) can also be useful in these situations to test for voltage where cables without a metallic sheath are to be identified. However, once insulation is pared using live working practices to reveal the underlying conductors, contact voltage detectors should be used as the means of proving dead.
GUIDE TO ISOLATION PROCEDURE

Step 1
Check it is safe and acceptable (with the occupier/user) to isolate. If the isolator is an off-load device, remove the load. Open the means of isolation for the circuit(s) to be isolated and secure the isolating device in the open position with a lock or other suitable means.

Step 2
Prove the correct operation of a suitable voltage detection instrument; see note 5, against a known voltage source, such as that illustrated. Steps 3 and 4 are shown overleaf.

Notes (also see notes overleaf)
(1) This guide gives information on safe working procedures for the isolation of the supply of electrical energy to electrical equipment.
(2) The example illustrated shows the minimum steps required to isolate the final circuits supplied by a single-phase consumer unit. The consumer unit includes an isolator and circuit-breakers.
(3) When circuits are protected by fuses enclosed in a distribution board, remote isolation of the supply to the distribution board may be required.
(4) HS(G)65 Electricity at work safe working practices gives detailed guidance on devising safe working practices for people who carry out work on or near electrical equipment.
(5) Guidance on voltage detection instruments is given in HSE Guidance Note GB 36 – Electrical test equipment for use by electricians.

GUIDE TO ISOLATION PROCEDURE (continued)

Step 3
[steps 1 and 2 are shown overleaf]
Using a voltage detection instrument, check that there is no dangerous voltage present on any circuit conductor to be worked on. It is important to confirm that conductors are not energized, for example, due to a wiring fault. Check terminal voltages between: (1) earth and line, (2) neutral and line (as shown) and (3) earth and neutral.

Notes:

a. In practice the equipment being worked on is likely to be remote from the consumer unit, for example, a socket-outlet located remotely from the means of isolation. In this case it is necessary to check that all the socket-outlet contact terminals are dead.

b. When checking for a voltage between an earth terminal and live (including neutral) terminals, the test probe should make contact with the earth terminal first, to reduce the risk of the remaining probe becoming live.

NOTES (also see notes overleaf)
(6) The Electricity at Work Regulations 1989 require precautions to be taken against the risk of death or personal injury from electricity in work activities. Regulation 12 requires that, where necessary to prevent danger, a suitable means is available for cutting off the supply of electrical energy to any electrical equipment, and isolation of any electrical equipment.
(7) The Health and Safety Executive booklet HSG65 - Memorandum of guidance on the Electricity at Work Regulations 1989 is intended to help duty holders meet the requirements of the Regulations.