

Lock Out and Tag Out

Objective

To, identify the safety precautions to be implemented when hard wired electrical equipment is isolated prior to electrical work being carried out.

Method

To maintain the electrical safety of persons working on fixed wired electrical equipment it is necessary to ensure that the equipment cannot be accidentally energised while work is being carried out. This is not only a common-sense safety requirement, but it is also included in the Electrical Safety Regulation 2013.

Legislation

Part > Division 1 > Section 17 stipulates that if an electrical worker has isolated an item of equipment (by switch or fuse) and while the worker is performing the work, the worker does not have the isolation point under the worker's sole effective control, then the electrical worker must ensure?

- that there is attached to the device, in a prominent position, an employer supplied warning sign, and
- the isolation point, when in the open position, is locked; or other precautions are taken to stop the device being accidentally closed.

Personal safety

Isolation can be achieved by methods or systems using locks, rendering the mechanism inoperable, a combination of these or by another equally safe method. In situations where other people can access isolation points, it is important that the isolation method or system cannot be inadvertently or easily compromised.

Caution (All):

- check for relays, contactors, PLCs, etc that locally or remotely energises and de-energises the electrical equipment
- check for change over contactors, alternative feeds such as emergency generators, UPSs, solar installations etc that locally or remotely energises the electrical equipment.

Caution (Restricted electrical licence holders):

- some hot water units may have a booster element fed from a separate circuit breaker and different tariff
- check for controlled tariff equipment that remotely energises and de-energises the hot water unit – note position of contacts
- if the circuit configuration is not easily determined to ensure isolation then contact a licensed Electrician for advice.

Before any electrical work is performed on isolated electrical equipment, a test to ensure the equipment has been positively been isolated must be carried out.

Recheck test equipment on a live source to ensure it is still working correctly.

Caution (All)

- if the electrical equipment was already de-energised (e.g. hot water unit controlled by remote tariff equipment) and isolation was not proven by use of test instruments, then further precautions must be taken while working on the equipment cables (e.g. wearing insulating rubber gloves and using insulating mat).

A Lock Out Tag Out permit - LOTO (BEMSPERM010) MUST be completed for all electrical isolations and attached with the relevant work order.

Exception:

A Lock Out Tag Out Permit (BEMSPERM010) is NOT required to be completed if the work is on the following:

- Routine maintenance on HVAC fixed plant, AND;
- Then plant has a local single isolation point, AND;
- Less than two workers are locked onto the plant, AND;
- Electrical components aren't being worked on

The plant must still be locked out in accordance with BEMSSWMS010 and safe work practices.

If at any point the scope of works changes outside of the maintenance schedule, such as a faulty component being replaced, a new risk assessment must be completed for the task and a Lock Out Tag Out Permit completed.

Low Voltage Isolation and Lockout Procedure:

- **Consultation:** Consult with the person in control of the workplace & others affected by the work. (eg, in relation to the timing of the work, to minimise disruption to others)
- **Isolation:** * Identify the circuit (s) requiring isolation.
- Isolate/disconnect active conductors from the relevant source(s), noting there may be multiple sources & standby systems/generators, photovoltaic systems as well as auxiliary supplies from other boards.
- If a removeable or rack out circuit breaker or combined fuse switch (CFS) is used, it should, if reasonably practicable, be racked out or removed then locked open & danger tagged.
- **Securing Isolation:** Locking the isolating switch(es) where practicable or removing & tying back relevant conductors to protect the person (s) carrying out the electrical work.
- **Tagging:** Tagging the switching points where possible to provide general information to people at the workplace.
- **Testing:** Testing to confirm the relevant circuits have been de-energised & any other relevant conductors in the work area.
- **Re-testing as necessary:** * If a person carrying out work temporarily leaves the immediate area, checks & tests must be performed on return to ensure the electrical equipment being worked on is still isolated.

Removal of Safety Tag / Lock-out and Energisation

- ensure that all electrical tests have been complete
- check that all equipment is safe to be energized
- notify all persons involved in the work activity that the equipment will be energized
- only remove the danger tag or safety lock **that you have installed** unless the original person is absent from the workplace or is unable to remove the lock and tag because of unforeseen circumstances. Persons removing a danger tag placed by others shall bear the responsibility to test and recommission the circuit and prove it safe to operate.

Out-of-service Tag

An out of service tag shall be fixed to any item of equipment that is not electrically safe. The tag shall not be removed until the item of equipment has been repaired and tested and proven that it is electrically safe.

5. Isolation, locking off and access

Extract from the Electrical Safety Code of Practice 2021 section 5

To ensure electrical equipment or circuits remain de-energised while working, the electrical equipment or circuits should be effectively isolated from all relevant sources of electricity supply. This may be done using opening switches, removing fuses or links, opening circuit breakers or removing circuit connections.

The standard steps for isolation are:

ES Regulation section 16 A person conducting a business or undertaking must ensure that electrical equipment that has been de-energised to allow electrical work to be carried out on it is not inadvertently re-energised while the work is being carried out.

Consultation

Consult with the person with management or control of the workplace (e.g. in relation to the timing of the work) and notify any other affected persons as appropriate.

Isolation

Identify the circuit(s) requiring isolation.

Disconnect active conductors from the relevant source(s), noting there may be multiple sources and stand-by systems, generators or photovoltaic systems as well as auxiliary supplies from other boards.

If a removable or rack out circuit breaker or combined fuse switch is used it should, if reasonably practicable, be racked out or removed and then locked open and danger tagged.

Securing the isolation

Lock the isolating switch(es) where practicable or remove and tie back relevant conductors to protect the person(s) carrying out the electrical work.

Tagging

Tag the switching points where possible to provide general information to people at the workplace.

Testing

Test to confirm the relevant circuits and any other relevant conductors in the work area have been de-energised.

Re-testing as necessary

For example, if the person carrying out the work temporarily leaves the immediate area, tests must be carried out on their return to ensure that the electrical equipment being worked on is still not energised, to safeguard against inadvertent reconnection by another person.

For example, to see if a wire has changed its status when cut, which can occur because it is lifted from earth.

The effectiveness of isolation procedures relies on:

- isolation points being readily available, accessible and being suitable for the type of isolation (switching) being conducted
- the necessary hardware
- having isolation procedures documented and accessible to electrical workers in the workplace
- the provision of instruction, information and training of electrical workers involved with the electrical equipment
- appropriate supervision to ensure safe work procedures, including the isolation procedures, are followed.

Safe isolation procedures, including the use of locks and tags as discussed below, should be developed in consultation with relevant workers.

5.1 Securing the isolation

As a person conducting a business or undertaking (PCBU), you must ensure that each exposed part is treated as energised until it is isolated and determined not to be energised, and each high-voltage exposed part is earthed after being de-energised.

You must also ensure that electrical equipment that has been de-energised to allow electrical work to be carried out on it is not inadvertently re-energised while the work is being carried out.

For work on electrical equipment or circuits, ensure:

- that the correct point of isolation is identified
- an appropriate means of isolation is used
- the supply cannot be inadvertently re-energised while the work is carried out.

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

Tagging systems should also be used at the point(s) of isolation, where possible, to provide general information. The isolation should be secured by locking off and tagging the electrical equipment as outlined below.

Instruction, information, training and supervision

You must ensure instruction, information, training and supervision are provided, so far as is reasonably practicable, to ensure that electrical equipment that has been de-energised to allow electrical work to be carried out is not inadvertently re-energised. This includes appropriate instruction, information and training on isolation procedures.

Locking off

Isolation points should be fitted with control mechanisms that prevent the electrical equipment from being inadvertently re-energised. The control mechanism should require a deliberate action to engage or disengage the device. It should be able to withstand conditions that could lead to the isolation failing (e.g. vibration). This may include switches with a built-in lock, and lock-outs for switches, circuit breakers, fuses and safety lock-out jaws (sometimes called 'hasps').

All circuit breakers, switches and combined fuse switch units should be locked off to secure the isolation where possible. See Figures 5 and 6 below for examples of locking-off methods incorporating danger tags.

Alternative controls may include an additional component (e.g. a clip, screw, bolt or pin) that can be inserted to prevent a switch from being operated. These types of controls should be used in conjunction with additional control measures, such as danger tags and permit systems.

If more than one person is working on the same de-energised electrical installation, individuals should ensure their own personal lock is applied to the isolation point, otherwise the principles of tagging apply (see below).

No-one should operate an isolator or knowingly use equipment where the isolator has a control mechanism attached.

In situations where isolation points are accessible by other persons at the workplace, you should ensure, so far as is reasonably practicable, that the isolation method or system is not able to be inadvertently or easily compromised.



Figure 5 Locking off methods incorporating danger tags—danger tagged locking-off hasp

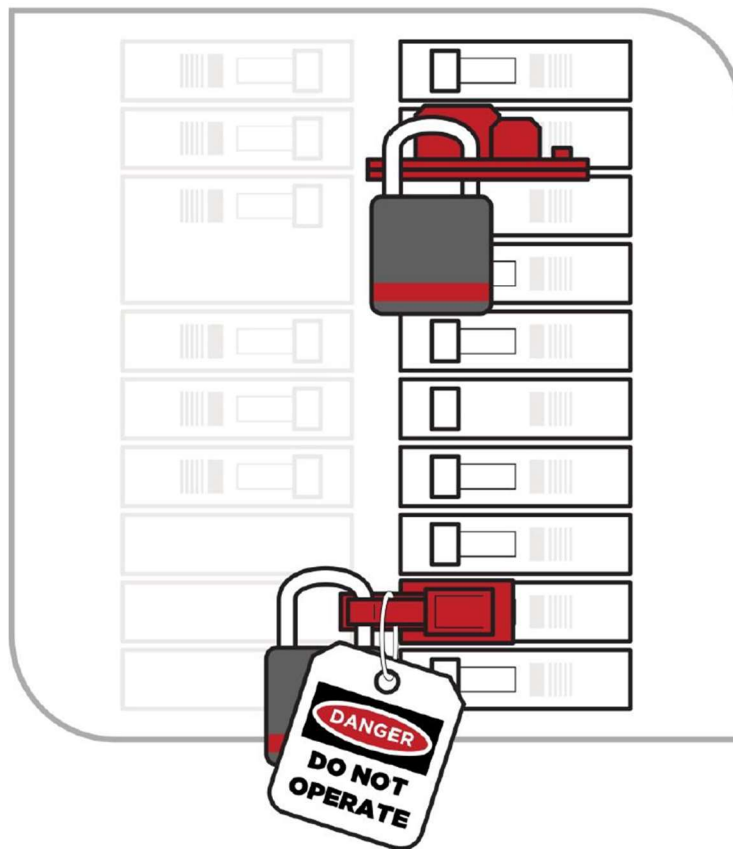


Figure 6 Locking off methods incorporating danger tags—danger tagged circuit breaker locking-off devices

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Tagging systems

Danger tags

Isolation involves using suitable warning or safety signs as well as locks or other controls to secure the isolation.

Where possible, a tag should be attached to normal locks (as shown in Figure 5) at all points of isolation used to de-energise electrical equipment from its electricity supply.

A tag does not, by itself, perform the isolation function.

Danger tags are not required when using dedicated personal isolation locks.

Danger tags (see Figure 7) are used for the duration of the electrical work to warn persons at the workplace that:

- the electrical equipment is isolated or out of service
- the electricity supply must not be switched back on or reconnected
- reconnecting electricity may endanger the life of the electrical worker(s) working on the equipment.

The danger tag should:

- be durable and securely fixed to the isolator
- clearly state the warning, including any warning about specific hazards relating to the isolation (e.g. multiple points of supply)
- be dated and signed by the worker or workers involved in carrying out the work or, where appropriate, by the supervisor in charge of the workers
- be attached in a prominent position on each isolation point (i.e. the point or one of many points used to isolate electrical parts) or device
- only be removed by the signatories to the tag. If unavailable and unable to return, measures must be put in place to manage risks associated with removing the lock or tag (e.g. thorough investigation to ensure all workers and others at the workplace are safe).

If the work is incomplete, for example at a change of shift, the last person removes their danger tag or lock and replaces it with a warning tag, for example out-of-service or caution tag.

When work is resumed, the person in charge of the work removes the warning (out-of-service or caution) tag and each person then applies their danger tag and/or lock.

When work is finally completed, each person removes their danger tag and/or lock.

Where a formal permit system is used, all reasonable steps should be taken to ensure that the designated sign-on and tagging procedures are followed.

Tagging systems - Out-of-service tags

Out-of-service or caution tags (see Figure 8) are used to identify electrical equipment that is not safe to use or fit for purpose.

The out-of-service or caution tag should:

- be durable and securely attached
- clearly state the nature of the defect or reason why the electrical equipment is unsafe
- be attached on a prominent position on each isolation point
- only be removed by a competent person after fixing or rectifying the defect and making the electrical equipment safe, or replacing with a danger tag in preparation to work on the equipment.



Figure 7: Example of a danger tag



Figure 8: Example of an out-of-service tag

Referenced Practices:

- BEMSPRAC003 Before Use Inspection of Electrical Test Equipment
- BEMSPRAC004 Before Use Inspection of Safety Equipment
- BEMSPRAC005 Safety Precautions When Working on Electrical Equipment
- BEMSPRAC007 Risk Assessment Testing and Fault Finding
- Electrical Safety Code of Practice 2021 section 5

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