Work dead safely.
Stay alive

The importance of safe isolation and lockout

SELECT

Contents

What is safe isolation?

isolation *n.* a function intended to make dead for reasons of safety all or a discrete section of the electrical installation by separating the electrical installation, or section thereof, from every source of electrical energy.

Isolation means the operation of switches, the removal of fuses or links or physical disconnection of conductors in order to make any system or part of a system dead and secure so that it cannot be inadvertently made live. This will involve cutting off an electrical installation, a circuit or any equivalent item from every source of electrical energy.

Safe isolation is a procedure carried out to ensure that electrical circuits or equipment are safe before any work on them is undertaken.

This vital procedure is put in place to ensure that anyone working on or near live electrical systems isn't exposed to danger that could cause injury or death.

Most electrical accidents occur because people are working on or near equipment that is:

- thought to be dead but which is live, or
- is known to be live, but those involved don't have the correct training or equipment to prevent injury, or have not taken adequate precautions.

It is therefore vital to ensure that, before any work starts on an electrical installation, a robust system is in place to establish that it is isolated and proven 'dead', i.e. has no electrical current running through it.

Having such a safe isolation procedure documented and set in place will protect both you and others from a possible fatality.

The message is clear:
Work dead safely. Stay alive.

The importance of safe isolation

Every year, electricians working on construction, refurbishment and maintenance projects suffer electric shock or burns – some fatal.

Many are a direct consequence of not implementing safe isolation procedures, contrary to training and written method statements and risk assessments.

Other contributing factors include contractors being persuaded to energise installations before they're complete or the widespread use of non-compliant test equipment.

However, failure to work dead safely can have horrific consequences.

Electric shock

If a person is in contact with a 'live' conductor and also with earth or another conducting part, this completes a circuit and current will flow through their body, also known as an electric shock.

The amount of current flowing through the body will depend on the voltage and the resistance of the circuit, but can lead to heart failure, otherwise known as cardiac arrest.

Burns

Burns can be suffered where the current enters and exits the body, particularly on high voltage (HV) systems but it can also occur on low voltage (LV) systems. In severe cases, this can cause burning of the skin and even the internal organs along the path of the current.

Examples of both electric shock and burns caused by not working dead safely can be found on pages 8 and 9.

Employer's checklist

While it's essential for operatives to follow safe isolation guidance while working, it's equally essential for employers to put checks in place before that work begins.

As well as making a suitable assessment of the health and safety risks to employees and other persons, employers should also ensure that all employees involved in electrical work:

- ✔ Are competent, with relevant technical knowledge, training and experience
- ✔ Have been instructed on, and trained in, the implementation of safe systems of work
- ✔ Implement these same safe systems of work at all times
- ✔ Have access to suitable tools, PPE and equipment and know how to use them.

In addition, if employees haven't received suitable training and instruction in safe systems of work, they should only work under the supervision of a competent person.

Learning lessons from tragedy

Michael Adamson was an experienced electrician who died in a preventable electrical incident in August 2005.

The 26 year old cut a cable marked 'NOT IN USE', which wasn't safely isolated and was instead wired into a distribution board.

Michael's employers had issued a method statement that said: "Before working on electrical equipment, it should be isolated and secured by means of a padlock."

However, devices for lock-off/tag-out weren't provided and instead, the on-site practice was to use insulating tape.

Because this fundamental safety procedure wasn't followed, a young man lost his life, his family lost a son and brother and his fiancée lost her husband-to-be.

Michael's sister, Louise Taggart, now travels across the UK in a bid to reduce the number of people who die or are injured in preventable workplace incidents

She said: "Michael's employer was found guilty of health and safety offences and fined £300,000. However, this provides little in the way of justice and nothing in the way of comfort for our family.

"My hope is that by telling his story, it helps ensure a lasting and positive legacy that will prevent anyone else from losing a life or a loved one."

In 2018, Louise was named Most Influential Person in Health & Safety in the UK by *Safety and Health Practitioner* magazine.

Find out more about her work at **www.michaels-story.net**

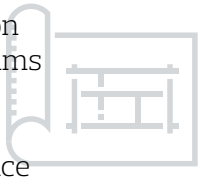
10 Steps to S

1. Before you start

Get permission from the appropriate person and agree the work to be done.

2. Find your spot

Speak to the authorised person and check diagrams or drawings to identify where the isolation device can be found.

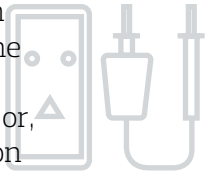


3. Check your equipment

Check the condition of probes, leads, casing, ratings and ranges, plus calibration intervals where applicable.

4. Test it out

Check your voltage tester on a proving unit, the equipment's in-built test facility or, as a last resort, on a known live source.



5. Switch it off

Make sure that switching off isn't going to cause any damage or unnecessary inconvenience.

Watch our 10 Steps to Safe Isolation video at bit.ly/safety-isolation

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afe Isolation

6. Make it secure

Lock and secure the isolation device. Keep hold of the key and restrict access to the device where possible.

7. Warn any others

Display a 'Do not switch on' notice at the isolation point and put up warning signs at work areas.

8. Test the circuit

Verify the circuit and equipment are 'dead' by checking between live conductors and earth at the access point.

Single phase circuits: *Test between L–N, L–E & N–E*
Three phase circuits: *Test between N–L1, N–L2 & N–L3 then E–L1, E–L2 & E–L3 then L1–L2, L1–L3 & L2– L3 and finally N–E*

9. Check it again

Re-check your voltage tester using a proving unit, the equipment's in-built test facility or, as a last resort, a known live source.

10. Is everything good?

Now you can safely begin work.

Dangers of not isolating safely

Factory fireball

After a fusebox fire in a factory in Cumbria, an electrician and an apprentice were told to remove debris from the box and fit a cover over it. However, to keep machines working and prevent the factory being shut down, some live cables passing through the fusebox weren't isolated. The two workers were subsequently engulfed in a fireball and the electrician suffered burns to nearly half his body.
The company was fined £90,000.

Insulation tape risk

An electrician was working underneath a sink in a property where a circuit-breaker had been switched off and insulating tape applied. His colleague switched it back on, assuming the work had been completed, and when the electrician stripped insulation off the live conductor he was electrocuted. The company was prosecuted and fined £100,000.

Washing machine shock

During the conversion of a building into flats, a plumber climbed into a sink cupboard head-first while installing a washing machine. The 23-year-old's head came into contact with the water pipe and he was electrocuted when he touched the casing of the machine, which was plugged in to a socket-outlet. Even though the company's electrical division had signed the electrical work off as being satisfactory, the line and earth connections were subsequently found to be reversed, causing the machine casing to become live.

Scaffolding horror

A 32-year-old worker was erecting scaffolding when the structure came into contact with a 33 kV overhead power line.

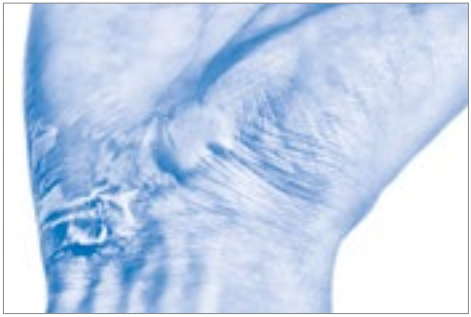
The resulting electric shock caused horrific injuries, including:

- Amputation of both feet, his left arm above the elbow and right arm below the elbow
- Severe burns to his legs and back
- Damage to his vocal chords
- Being in an induced coma for six weeks.

The scaffolding company was fined £80,000 and its director was sentenced to six months in prison.

Joiner's blast burns

A building company was refurbishing flats in Aberdeen when a joiner attempted to move a redundant cut-out, which was thought to be dead. In fact, the cut-out was still live and the resulting short circuit melted the cable and created a small explosion, setting the joiner's boilersuit on fire and burning his face and hands. The firm was fined £9,000 and ordered to pay the joiner £4,000 in compensation.



Further information and training

Further information on safe isolation can be found in the publications listed here, at the Health and Safety Executive (HSE) website at **www.hse.gov.uk** and at **www.electricalsafetyfirst.org.uk**

SELECT also offers a training course in safe isolation that can help to prevent incidents that could result in electric shock or burn injuries.

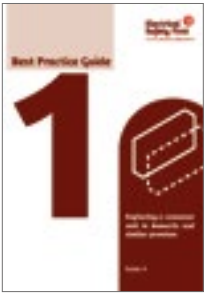
Also known as course 217, the half-day session provides practical guidance on low voltage safe isolation procedures during construction projects.

Presented by SELECT's experienced technical team, the module covers:

- HSE concerns
- The dangers arising from failure to isolate safely
- Legislation and guidance
- Safe working practices
- Step-by-step safe isolation procedures
- Use of suitable means of isolation
- Use of suitable equipment to prove dead
- Site safety management.

The course is particularly relevant to situations where work is being carried out in the presence of other trades, and on sites where more than one electrician is employed.

The course costs £70 plus VAT for SELECT Members and is also available for non-Members. More details are available on **0131 445 5577** and at **www.select.org.uk/training**



Issue 4
Published June 2019
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ESF Best Practice Guide 1
Replacing a consumer unit in domestic and similar premises

Issue 3
Published February 2015
Download at
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ESF Best Practice Guide 2
Management of electrical and safe isolation procedures for low voltage installations

Issue 3
Published November 2015
Download at
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ESF Best Practice Guide 3
Connecting a microgeneration system to a domestic or similar electrical installation

3rd Edition
Published
August 2013
Download at
books.hse.gov.uk

HSE Electricity at Work
Generic guidance on safe working practices for working dead or alive on electrical equipment

3rd Edition
Published
October 2015
Download at
books.hse.gov.uk

HSE Electricity at Work Regulations 1989
Sets out advice and gives technical and legal guidance on the EAW Regulations

Published October 2007
Revised June 2013
Download at
books.hse.gov.uk

HSE Leading Health and Safety at Work
Actions for directors, board members, business owners and organisations of all sizes

Published
August 2014
Download at
hse.gov.uk

HSE Risk Assessment
A brief guide to controlling risks in the workplace

All publications correct at time of going to press. All are subject to ongoing review and may change at short notice. Please check with the relevant body to ensure you access the most up-to-date version.

Founded in 1900, SELECT is Scotland's largest construction trade association.

It has nearly 1,250 member businesses who collectively have an annual turnover of around £1 billion and employ over 15,000 people and 3,500 apprentices.

SELECT also delivers training courses to more than 3,500 electricians each year and is committed to regulation of the industry for a safer Scotland.

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