

COMPLETE MANAGED COMPLIANCE SERVICE

Dutyholder Guidance for Education

Incorporates
Electricity at Work
Regulations 1989 and
18th Edition BS 7671:2018+A4:2026



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Foreword - Education Present and Future

The Education sector has arguably been subjected to the vagaries of the economy, changes in government and public opinion more than most. The latest thinking on Education is that of Academies. Successive Governments have invited Secondary and Primary schools to apply for Academy status. As of 2014, 56% of Secondary schools are now Academies, and some 13% of Primary Schools. At the present rate of conversion all Secondary schools would have converted to Academies by 2020 assuming the next Government maintains a similar policy on the subject.

Why convert to an Academy?

From the above statistics it would seem there is a positive case to be made for converting. Among the many reasons for doing so is a desire on the part of Schools to take more responsibility for their affairs. Some schools have referred to a desire to take more direct control over matters that have previously been the domain of the local authority. There may also be a perceived financial advantage in doing so, with Academies being able to improve their budget scope by 7% or more. Unfortunately this is subject to political and economic influences. **Academies also consider that they can get a better deal elsewhere for services etc. by not having to purchase through the Local Authority.**

Freedom brings responsibility

Many schools have mentioned the excitement and energy generated by achieving greater responsibilities and freedoms. Not to be underestimated however is the seriousness of undertaking Dutyholder responsibilities associated with maintaining a Safe Place for Work, Play and Learning. These responsibilities were previously delegated to the Local Authority.

Now you're on your own!

Or maybe you're not!

1. The purpose of this Guide

The purpose of this Guide is to highlight the important aspects of being a Dutyholder and how to comply with your legal responsibilities.

It's also taken as a given that nobody wants to harm, injure, or kill anyone at work, or to burn their workplace down.

This Guide is very much couched in electrical terms as this is the world the authors come from. Electrical safety is what they know about, therefore all the legal and practical elements of this Guide are expressed in electrical terms.

Please note however that the basics are the building blocks of any safety system and apply to a multitude of disciplines and issues in the workplace.

Hopefully when you've read and digested the contents of this Guide you will be able to determine your position on the following:

What is a Dutyholder?

Am I a Dutyholder?

What danger does electricity pose in my workplace?

How can I protect myself?

How can I stay out of court and in business?

What are the HSE up to at the moment?

What is the Law requiring me to do?

How can I keep my records in order?

2. Electricity – the danger to people

If someone told you that you have something in your premises that is more dangerous than a nuclear power plant would you be surprised?

No one would deny how dangerous nuclear energy can be if it goes wrong. Just look at the Fukushima disaster of March 2011. but accidents like Fukushima don't happen every day and they don't directly and immediately endanger you or your premises when they happen. The danger is indirect and may take 10 or 15 years or more to have lethal consequences for you.

Electricity however is the most dangerous form of energy known to man.

Why?

- It can kill in 10 to 15 seconds.
- It doesn't alert the senses that normally tell you there's danger – you can't see it or smell it – although touch it and you'll feel it!
- It inspires curiosity! Most people when faced with a bare copper conductor ask themselves – is it live or is it dead? And some of us then feel the strange urge to reach out and touch it to see if it is or not.
- It doesn't care who you are. Whether you're the most qualified person on the planet, or a toilet cleaner, it'll kill you if it can!

And most significantly ...

- Unlike nuclear energy, it's used by rank amateurs every day. Think about it. When did you last boil a kettle using strontium 90? Or iron your clothes using uranium? Nonsense of course. We use electricity for that. It's all around us. We wouldn't be without it.

And that's why it's so dangerous – it's ever present and very near, running our modern world.

Electricity – the danger to people

What happens when you get an electric shock?

- Muscles tighten up, making it almost impossible to pull away from the circuit.
- Lungs constrict, making it hard to breathe.
- Heartbeat is interrupted and blood vessels tighten.
- Burns occur where the electricity enters and leaves the body.

Humans are good conductors of electricity. That means that electricity flows easily through our bodies. Why? Because electricity moves quickly through water - and the human body is 70 percent water!

Another fact you need to remember is that **electricity always tries to find the easiest path to the ground.**

You might think that if you receive an electric shock, you can pull away quickly and not get hurt. But **the effects of electricity can be felt immediately**, so a person has almost no chance of pulling away. And if the electricity is strong enough, it can cause the victim's muscles to tighten up so much he or she can't let go.

Remember that the heart is a muscle in itself. It can also be “frozen” by electric current

Even relatively low currents can often scramble nerve cell signals enough that the heart cannot beat properly, sending the heart into a condition known as fibrillation. A fibrillating heart flutters rather than beats, and is ineffective at pumping blood to vital organs in the body.

In any case, death from asphyxiation and/or cardiac arrest will generally result from a strong enough electric current through the body.

Scary stuff!

3. Electricity – the danger to your business

Not only can it kill people, it can also kill your business!

Fires caused by electrical faults account for over 25% of all large loss claims – second only to arson.

The insurance industry acknowledge that 75% of businesses that make a large loss insurance claim, never re-open for business, or close within 12 months.

The true cost of a major fire:

- Business interruption
- Cost of relocation to alternative premises
- Loss of reputation – who needs that kind of publicity?
- Production failure
- Loss of data or other irreplaceable assets
- Letting down and losing customers
- Higher insurance premiums

You might not be able to make a claim!

Insurers are being more pro-active in demanding higher standards of risk management from clients. Many insurers now embed the requirement for premises to have current test/certification within the middle of policy wordings – do you read your policy wording?

Insurers are more willing to decline claim payments where there is reasonable justification. One major insurer has declined 3 claims over a 3 year period totalling £10million

Reputable insurers do not try to escape their responsibilities. They don't try to avoid paying out unless there is justification. However clients have a different perception.

At a recent conference a speaker was commenting on the need to carry out inspection and testing to satisfy one's insurer. He asked the audience to raise their hands if they believed that given a chance, their insurer would turn down a claim. The overwhelming majority raised their hands (not at all fair on the reputable insurers – but perception is everything).

The questioner responded by asking the audience – If you believe that, then why do you give them a reason to turn down your claim by not having your electrics inspected and tested when it's a requirement of your policy! – fair comment?

4. Breaking the Law – a danger to people and business

When we talk about ‘the Law’, in matters to do with Health and Safety we are talking about an **Act of Parliament** known as The Health and Safety at Work Act 1974 (HASAWA). This is a piece of ‘umbrella’ or enabling legislation under which a number of ‘**Regulations**’ sit and are enacted by the Minister responsible.

It’s done in this way so that Regulations can be altered or new ones introduced without the need for the whole Act to be passed by the UK Parliament again. If you are prosecuted this will usually be under the HASAWA as this is the most powerful legislation available and it doesn’t go into specifics. It can be used to frame the basic charge against you concerning your failure to discharge your duty of care under this Law.

As far as your specific failings are concerned, the pertinent Regulation can then be called upon to detail your specific shortcomings. The Health and Safety at Work Act 1974 basically requires that the operator of a business and its premises has provisions in place to safeguard the health and safety of all visitors, employees, subcontractors etc. whilst they are under their control. It also requires the latter to cooperate fully with those provisions.

The HASAWA doesn’t tell employers how to do that in any detail. The individual Regulations expand on the requirements of the Act as applied to specific areas of activity. This might cover issues such as noise on site, the presence of asbestos, managing fire risk etc.

So how do you know you’re doing what the law requires? – we can’t all be lawyers can we?

Here the Health and Safety Executive tries to help employers as much as possible by referring them to 2 helpful provisions:

- Guidance documents.
- Approved Codes of Practice.

Guidance documents:

The HSE publishes guidance on a range of subjects. Guidance can be specific to the Health and Safety problems of an industry or its processes. The main purpose of the guidance is to:

- Help people to **interpret** - helping employers to understand what the law says.

To help people **comply** with the law – The HSE would prefer you to keep the law. To give technical **advice**. **Example of Guidance:**

The Electricity at Work Regulations 1989 are published in a form that shows the law in italics and then provides guidance notes in plain English to help Dutyholders to comply with what the law requires. The Guidance Notes are published side by side with the legal text and provide expert guidance as to what is best practice.

Approved Codes of Practice (ACOPs)

Approved Codes of Practice offer working examples of good practice. For instance, Regulations often contain obligations which are either:

- **ABSOLUTE** - to be undertaken without regard to time, effort and expense or...
- **AS FAR AS REASONABLY PRACTICABLE** - where the danger can be weighed against the cost, time and expense involved in removing the risk.

The first one (Absolute) is straight forward – you have to do whatever the Law requires without any kind of qualification.

But what does ‘as far as is reasonably practicable’ mean? Here ACOPS can be of assistance. They give advice as to what meets the criteria. If a regulation uses words like ‘suitable and sufficient’ an ACOP can illustrate what this requires in certain circumstances.

HSE comments on the subject: *“If employers are prosecuted for a breach of Health and Safety law, and it is proved they have not followed the relevant provisions of an ACOP, a court can find them at fault unless they can show they have complied with the law in some other way”.*

Example of an ACOP in operation :

BS7671 18th Edition Wiring Regulations.

Although called “Regulations” they are not statutory they are an ACOP.

They merit being called regulations because of their being referred to in the Electricity at Work Regulations 1989 which are statute. EaWR states that “if your installation complies with BS7671 you are likely to achieve compliance with EaWR” legislation. Compliance cannot be 100% guaranteed because whereas BS7671 covers installations up to 1000 volts, EaWR covers unlimited voltages. This shows exactly how an ACOP can help employers to comply with legal requirements.

Important Note:

In times past a document such as BS7671 would not have been admissible as primary evidence due to the fact that it is not a legal document. Statute law (providing it is proved to apply) is always the Primary or Mandatory Authority. Documents such as the Wiring Regulations are only Secondary or Persuasive authority. Nowadays however prosecutors have established the right to refer to these codes of practice to establish what an accused person, or business’s duties are under the law.

An example of this is shown in the section – What’s new? - latest legislation.

So what are the HSE saying?

That you are free to choose whatever methods you wish in order to comply with the law. You don't have to follow the guidance documents, ACOPs or any other published information if you don't want.

BUT: make sure that your alternative method of compliance is at least as good as the official method(s) recommended.

In general terms the HASAWA asks you to do what is reasonably practicable. The policy of the HSE is to encourage employers to take whichever option affords the most flexibility and costs them least, while providing proper safeguards for everyone.

However some risks are so great that it would not be appropriate to allow employers discretion in deciding what to do about them. Some would simply decide that they can't afford the time, trouble or expense and either don't do anything or implement measures that fall short of what is required in view of the risks. In these cases the Regulations become ABSOLUTE.

You have no choice but to take the time, trouble or expense involved.

So what Regulations apply to me?

It depends on what your activities are. Not everyone will have the same degree of concern for all the areas the individual Regulations cover. There will be some Regulations that you may never need to bother about. However, the one set of Regulations that **everyone in the UK** has to be concerned about (unless there is such a thing as an Amish business in the UK) are those governing the safe use of **ELECTRICITY**.

It's one set of Regulations no one can avoid.

Electricity and the Law

The law demands that we use electricity safely. Electrical safety is mainly addressed under the Electricity at Work Regulations 1989 (EaWR). These statutory regulations are the law of the land. They do not get involved in specific detail, but provide the basic requirements for electrical safety.

Key Regulation for Dutyholders: EaWR Regulation 4(1) states “all systems shall at all times be of such construction as to prevent so far as it is reasonably practicable danger.”

This means no days off, no excuses – ‘at all times’ means exactly that.

HSE policy on enforcement of existing Health & Safety legislation

As with most health and safety legislation, prosecutions brought under the Electricity at Work Regulations commence with the premise that you are GUILTY until YOU prove yourself innocent. It is for YOU to prove yourself innocent or at least mitigate your guilt.

Note: The HSE state that they will only condone you not spending the cost, effort etc. if the cost is grossly disproportionate to the risk.

In view of the risks involved with electricity, failing to act on the basis of cost etc. is difficult to justify.

The HSE prosecute both individuals and companies for breaches of Health & Safety legislation.

The purpose of enforcement as stated by the HSE is to:

- ensure that Dutyholders take action to deal immediately with serious risks;
- promote and achieve sustained compliance with the law;
- ensure that Dutyholders who breach health and safety requirements, and Directors or managers who fail in their responsibilities, may be held to account, which may include bringing alleged offenders before the courts ...

(HSE's Policy Statement on Enforcement)

According to the HSE "... action is focused on the **Dutyholders** who are responsible for the risk and who are best placed to control it ..."

Who exactly is the Dutyholder?

There can be a number of 'Dutyholders' where electricity is concerned. Everyone who is involved with electricity, i.e. working on it, working with it and/or using it, from the engineer in the main switch room to the person on the shop floor pressing the trigger on a power drill can be termed a Dutyholder. However Regulation 3(2)(b) of EaWR 1989 states that a 'Dutyholder' must 'comply with the provisions of the Regulations in so far as it relates to **matters within his control.**'

So the extent of your Dutyholder responsibilities depends on the extent of your control.

You are the electrical engineer and are in control of all things electrical. You realise that you have not done any electrical testing at your site, or it's due/overdue for being carried out again. Right now you are in control as Dutyholder. You get an acceptable quote for doing the work and you send it 'upstairs' for approval. The message comes back from your Financial Director "sorry no money for that".

Question: Who's the Dutyholder now? Who is responsible if anything goes wrong?

Author's opinion: In this case - the Financial Director Why? Because he is now 'in control' under the law. You have discharged your Dutyholder responsibilities.

5. Additional legislation.

Health and Safety (Offences) Act 2008

The Health and Safety (Offences) Act came into effect in January 2009 and it modifies Section 33 of the Health and Safety at Work Act (which is why this is called an Act not a Regulation). It details changes to the mode of trial and maximum penalty allowed for those tried and convicted for offences under Health and Safety legislation.

The basic changes are the **places** where you can be tried and the **penalties** if found guilty. This Act has increased penalties and provided courts with greater sentencing powers for those who break health and safety law. In other words the law remains the same it's just been 'beefed up'.

Since the legislation was introduced the Legal Aid, Sentencing and Punishment of Offenders Act 2012 came into force on 12th March 2015.

The effect of the two Acts is to:

- raise the maximum fine which may be imposed in the lower courts to an unlimited amount for most health and safety offences.
- make imprisonment an option for more health and safety offences in both the lower and higher courts; (maximum 6 months in Magistrates Court and 2 years in Crown Court).
- make certain offences, which are currently triable only in the lower courts, triable in either the lower or higher courts.

Judith Hackitt CBE Chair of the HSE said at launch:

"It is right that there should be a real deterrent to those businesses and individuals that do not take their health and safety responsibilities seriously. ... We will continue to target those who knowingly cut corners, put lives at risk and who gain commercial advantage over competitors by failing to comply with the law".

which is better -

to be tried in front of a judge and jury or to take your chances of up to 12 months imprisonment before a JP? Although a legal advisor is on hand to assist, a JP is a volunteer often with no legal training. - You decide!

This legislation particularly affects Dutyholders. When it comes to prosecution anyone can end up in court depending on the degree of their control. However the prime responsibility is placed on Employers, Directors, Managers (see Sections 2 & 37 HASAWA). Why? Because management are deemed to have the resources and the authority necessary to provide a safety management system.

Directors, Managers and Supervisors can be held legally accountable following a criminal offence. Section 37 of the Health & Safety at Work Act 1974 states: *'Where an offence is committed by the company, but with the knowledge/ consent, connivance of, or was attributable to any neglect of a Director, manager or similar person, he as well as the company shall be guilty of the offence.'*

The Corporate Manslaughter and Corporate Homicide Act 2007

The HSE have described the Corporate Manslaughter and Corporate Homicide Act 2007 as a landmark in law. They comment that – “For the first time, companies and organisations can be found guilty of corporate manslaughter as a result of serious management failures resulting in a gross breach of a duty of care”.

The Identification principle – a key change. Previous law was defective because a prosecution required a “directing mind” who could be identified as the embodiment of the company itself. It proved almost impossible in practice to convict such a person in larger organisations.

Important Note: This legislation is aimed at businesses not people. However be aware that a person guilty of gross negligence which may have caused someone's death can still be tried personally under previous Health and Safety law.

Key Issues

In order for this legislation to apply the following conditions amongst others must apply:

- There must have been a death.
- You must have owed the deceased a duty of care (if it happened on your premises or as part of your activities it's difficult to avoid any duty of care link).
- Your business isn't exempt from prosecution (very unlikely – even the police come under it).
- The death must have been caused by your gross neglect in the way you managed your affairs*

Comment from a Coroner (*acknowledgement Lord Wolfe*):

For gross negligence manslaughter to be established there must have been the following:

- negligence consisting of **an act** or **failure** to act;
- that negligence must have caused the death in the sense that it more than minimally, negligibly or trivially contributed to the death; and
- the degree of negligence has to be such that it can be characterised as gross in the sense that it was of an order that merits criminal sanctions rather than a duty merely to compensate the victim.

*** Acid Test: But for management failure (if you had managed your affairs significantly better), would the deceased still be alive?**

Prosecutions under the Act will be for one of the following 3 reasons:

Unlawful act manslaughter – the most commonly prosecuted form of manslaughter and includes deaths that results where there was no intention to kill or cause very serious harm.

Manslaughter by reason of loss of control – Unlikely to apply here.

Manslaughter by reason of diminished responsibility – unlikely to apply here.

Factors courts will consider:

How foreseeable was the event?

How far short of the appropriate standard did the offender fall?

How common is this kind of breach in this organisation?

Was there more than one death or a high risk of further deaths?

Note: Amongst other things, the failure has to be “Gross neglect”. How does one establish Gross neglect?

Simple neglect can be caused by an act – something that we, or others acting on our decisions or under our management do that simply shouldn't have been done. It can also be because of not doing something that should have been done. It's what the law terms 'acts of omission or commission'.

Neglect means falling short of accepted standards. **Gross** neglect is falling **well short** of those standards of good practice and management. It follows therefore that there are degrees of neglect.

So how is the degree of neglect measured so as to know if it was gross neglect or not?



The degree of neglect is the difference between what you should have done and what you did do. Is the shortfall so great that a court could find it a gross failure?

What you actually did do is somewhat easier to identify than what you should have done. Bear in mind that under Health and Safety law you are GUILTY until you prove yourself innocent.

When any accident takes place, even if not fatal, there is prima facie evidence that the law has been broken. So what you did is in principle established before you go to court. What is less clear is what you should have done. Until that is established, the 'Gap' cannot be measured.

So what tells us what should have been done and therefore how wide 'the Gap' was?

Where the law is specific in its requirements you will be measured by that primary evidence. Where it is less clear secondary, non-mandatory evidence will be brought into the proceedings.

Remember the Guidance documents and ACOPS referred to previously? (see p9)

These set out what is acceptable and best practice. They will be accepted in court as evidence of "what should have been done". What you actually did will be measured against this. If you have done things that go against this guidance, or not done things that the Guidance notes tell you to do, then if the act or omission falls seriously short your business could be found guilty.

So who's the target?

Not me – it's my company right?

In some respects that's correct. However a company is represented by its management. They are responsible for what the company does. Under the Act an organisation is guilty of the offence if the way in which its activities are managed or organised causes a death and amounts to a gross breach of a relevant duty of care to the deceased, particularly in the way activities were managed by **senior management**.

So who exactly are 'the management'? - It could be you!

Senior management in relation to an organisation means the persons who play significant roles in:

1. the actual managing or organising of the whole or a substantial part of those activities
2. the making of decisions about how the whole or a substantial part of its activities are to be managed or organised

Example 1: I'm 'just' the electrical engineer in my factory. Can I be viewed as a senior manager?

Answer: If you organise, undertake or manage installation work, inspection and testing, maintenance etc. you come under category 1 above.

Example 2: I'm not electrical. I know nothing about it. I take on board what my electrical engineer tells me and make decisions on that basis.

Answer: You may not be the 'doer' or the subject expert, but you are the decision maker.

Conclusion: One or maybe both of you could end up in the witness box and spotlighted.

Remember they don't have to look for a 'controlling mind' any more. Employees at every level including quite junior employees can be deemed to be a 'manager'.

Question:

Can the offence be avoided by senior managers delegating responsibility for health and safety?

HSE answer:

*"No. Failures by senior managers to manage health and safety adequately, including through **inappropriate delegation of health and safety matters**, will leave organisations vulnerable to corporate manslaughter/homicide charges".*

What are the penalties?

Having determined the offense category a fine will be levied. How much?

At this point the court will focus on the organisation's annual turnover or equivalent to reach a starting point for a fine. The court will then consider further adjustment within the category range for aggravating and mitigating features.

Does size matter? - Not in determining guilt. The law must expect the same standard of behaviour from a large and a small organisation. Smallness doesn't mitigate, and largeness doesn't aggravate the offence.

A company's size will matter when it comes to determining the fine as the court will examine the company's previous three years accounts including items such as turnover; profit before tax; directors' remuneration, loan accounts, pension provision and assets as disclosed by the balance sheet. The Court will have the power to examine the guilty company's accounts and will have in mind its ability to pay the fine. However that won't necessarily be of first concern as the following comment about the first case brought to court shows:

But what [the first] case hasn't quite tested is a concept that the 2007 Act enshrines: "the ability of judges to fine a company out of existence if they see fit." Jonathan Grimes, partner at law firm Kingsley Napley

This is borne out by the comments from a judge who made a publicity order against a guilty company and said: "I propose to fine this defendant company every penny that it has. I have no power to do anything other than impose a fine and I can impose no more than all of its assets."

- A publicity order. This requires an organisation to publicise the fact of its conviction and certain details of the offence, perhaps by placing adverts in newspapers, journals, tv and radio. At the time of writing no details have been really settled as to how this may work
- In addition, the court can set a remedial order, requiring the organisation to address the cause of the fatal injury. This is unchanged (Improvement Notice system applies.)

Side Note:

Even if no prosecution takes place, you are open to a civil claim from the injured party or deceased person's family. Civil cases do not have to prove the case 'beyond reasonable doubt'. Decisions are based on a 'balance of probabilities'.

How can I protect myself and my business from prosecution under this or any other health and safety legislation? - not to mention the most important concern that is to prevent my business activities from killing or injuring anyone as a result of using the most dangerous form of energy known to man?

Remember you are **Guilty already** if anything goes wrong, so if it does you must put yourself in a defensible position.

Fee for Intervention (FFI)

FFI became effective from 1 October 2012

Introduced under regulations 23 to 25 of the Health and Safety (Fees) Regulations 2012. These Regulations put a duty on HSE to recover its costs for carrying out its regulatory functions from those found to be in material breach of health and safety law.

What does this mean?

It means that HSE Inspectors visit premises to inspect work activities and investigate incidents & complaints.

If an HSE's inspector sees material breaches of the law when visiting a business, the business they are visiting will have to pay a fee based on what the Inspector deems it is necessary for him to do from then on.

How much is the fee?

The fee is based on the amount of time that the inspector has had to spend identifying the material breach, helping businesses to put it right, investigating and taking enforcement action. At the time of writing it's £183/hour (over £1464/day).

Currently, the HSE levied charges generate over £9 million per annum.

What do they charge for?

- Identifying the material breach,
- Helping businesses to put it right,
- Investigating
- Taking enforcement action.

What's a material breach?

This is when, in the opinion of the HSE inspector, you have contravened health and safety law & the HSE needs to issue written notice of that to the Dutyholder.

What constitutes a notice?

HSE notification of contravention

- An improvement notice
- A prohibition notice
- A prosecution

6. What does the HSE look for?

Obvious faults - such as exposed or dangerous conductors



Competence



The ability to recognise and prevent Danger

Access protocols



Maintenance and Records



Are your records as neat as this? Can you access them easily?
Is there a better way of keeping records?

- See section 10 Stay in Control.

7. Defend yourself! - The Building blocks of safety

How can I protect me, my fellow Dutyholders and my business? Remember – it ain't what you do – it's the way that you do it!

Admittedly the Health and safety performance of businesses in the UK does differ from sector to sector. Some areas of activity may be more prone to accidents and incidents than others.

However, the fact that you undertake unavoidably more dangerous activities is no excuse. Some of the most graceful movements humans make are on an ice rink!

So what does cause accidents and incidents?

There are a number of theories, however H W Heinrich, a leading Industrial Safety Engineer developed what he called the Domino Theory. He believed that all accidents could be modelled with a chain of five factors. The factors can be visualised as a series of dominoes standing on edge - when one falls, the linkage required for a chain reaction is completed.

Each of the factors is dependent on the preceding factor. According to Heinrich the factors were:

- **Ancestry and social environment** – an individual's nature and nurture, what he is as a person where and how he was raised and educated.
- **The fault of a person** – basic traits such as arrogance, nonchalance, lack of care etc.
- **An unsafe act and/or physical hazard** – the way the job is done, in the place its done.
- **An accident – the resulting unwanted event** – this can include non-human events like fires and explosions.
- **The resulting injury** – or damage if it's a building rather than a person.

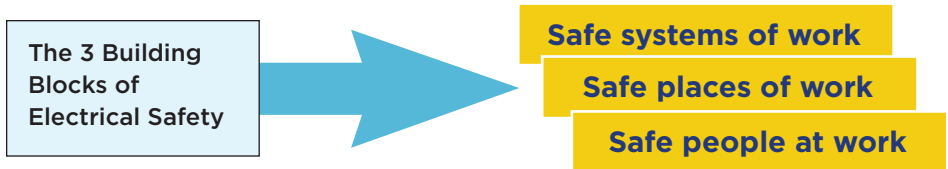
Heinrich maintained that if the chain could be broken before the accident, injuries could be eliminated. He believed that the easiest place to break the chain was by eliminating an **unsafe act or physical hazard**.

If true this theory greatly simplifies the approach to electrical safety. It means that management should concentrate on three areas, each of which would otherwise constitute a 'domino' in the chain.

We suggest leaving aside nature and nurture – it's hard enough to change yourself let alone someone else! Instead try to eliminate the unsafe acts and or physical hazards.

Concentrate on the 3 Building Blocks of safety ...

Defend yourself! - The Building blocks of safety



This means that it is less a matter of what you do and more a matter of:

- **How** you do what you do – the methods and systems you choose to adopt.
- **Where** you do it – the environment you create and the state of the equipment etc.
- **Who** does it – the competence of your employees and/or subcontractors to perform their tasks in a safe manner.

Under Health and Safety legislation a Dutyholder or employer has responsibilities particularly towards his employees (and others) to provide the following:

- **Information**
- **Instruction**
- **Training**
- **Supervision**

The extent of what has to be provided will depend upon your undertakings, environment, complexity of processes and so on.

Let's take an example of the 4 basics listed above:

Information - You provide signage showing fire points and fire exits.

Instruction - You tell everyone by various means how to access exits, the routes, assembly points etc.

Training - You hold fire drills and simulated emergency procedures.

Supervision - You appoint fire wardens to oversee the system.

Those four responsibilities apply to all aspects of Dutyholders responsibilities including that of electrical safety.

The 3 building blocks of safety will keep you safe, keep you in business and keep you within the law.

Let's look at each Building Block in turn...

8. Safe systems of work

What is a safe system of work?

A safe system of work is a laid out and considered method of working. It should relate to the complexities of what you do. It needn't be 'War and Peace'. Some things to consider:

- **Think** about the potential hazards to employees and other vulnerable persons.
- **Consult** other people including any experts outside the business. Don't go it alone.
- **Set out the steps** necessary for safe working in a formal framework including the physical layout of the job.
- **Communicate** the details to everyone.
- **Implement** what you've agreed.
- Constantly **monitor** how it's working (or where it's failing).
- Adequate **training** and **instruction** of people involved - See safe people at work.
- Provide adequate **supervision** and control - don't just rely on the good sense of the employees doing the work.
- Only select and provide **suitable plant and equipment** which is adequate for the operations to be performed - See safe places of work.
- If required provide **warnings** and **notices**.
- Include special instructions such as **Safety Rules** and **Safe Working Procedures**.

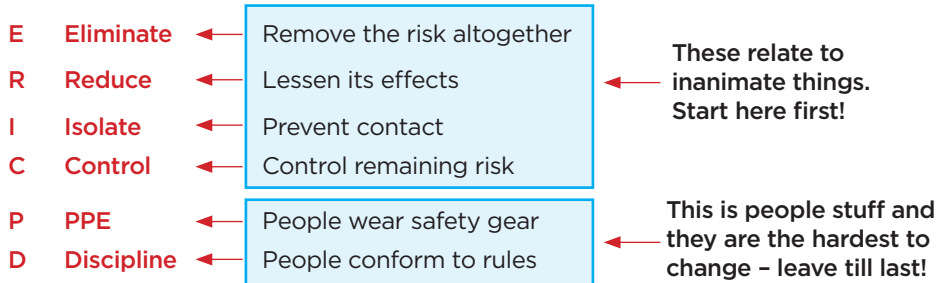
Note: The above list is not exhaustive. The more complex the processes in your business the more detailed and varied your systems, procedures and risk assessments etc. will need to be.

Safe systems of work

What is a safe system of work?

Like most Health and Safety legislation, the Electricity at Work Regulations calls for a risk assessment approach. Many know the acronym that characterises a safe system of work.

It is **ERICPD** (also remembered as 'Eric Prevents Death') It stands for



Believe it or not as long ago as **1865** a judge referred to Risk Assessment when he said: "Although in general an employer was not liable unless he knew of the danger... it was his business to know if by reasonable care and precaution he could ascertain whether the apparatus or machinery were in a fit state or not."

In other words the employer should assess the risks.

Example as applied to use of electricity:

- Eliminate** - very hard to do. Most modern activities involve using electricity. In explosive atmospheres for example it may be best to use non electrical pneumatic tools.
- Reduce** - The most obvious element to reduce is voltage. Current does the damage but voltage drives the current. Below 50 volts the effects are much less likely to be lethal.
- Isolate** - Use insulated tools and equipment, make sure terminals and connections in control panels are 'finger proof'.
- Control** - Use of safe working procedures, permit systems, warning signs, safety barriers etc.
- PPE** - Insulated gloves, mats safety spectacles and the like. Note: These are not the first resort. They are used after the first 4 because they depend on the behaviour of people. You can provide adequate PPE but you are dependent on the person wearing it properly and diligently.
- Discipline** - Enforce what you have in place, but again this is a people thing and should not be depended on as a first line of defence.

9. Safe places of work

Remember the umbrella regulation from Electricity at Work Regulations 1989 quoted earlier?

Key Regulation for Dutyholders: EaWR Regulation 4(1) states “All systems shall at all times be of such construction as to prevent, so far as is reasonably practicable, danger.”

This means no days off, no excuses – ‘at all times’ means exactly that.

This regulation tells Dutyholders what is required for a safe place of work electrically speaking.

1. All systems...

This means everything from a digital watch to the National Grid. It includes all the constituent parts, the circuitry, the electrical equipment and the energy sources on site such as transformers etc.

2. ... of such construction

This covers the physical condition and the arrangement of its components at any time during its life.

The life of an installation includes the following stages:

- When it was on the drawing board or in the mind of the designer.
- When it was being installed initially and as modified/added to during its life.
- Whilst being used by the building/equipment operator.
- Whilst being maintained or repaired, tested and inspected during its life.
- When being taken out of service or demolished at the end of its life.

3. ... to prevent ... danger

Danger means risk of injury from:

Electric shock

Electric burns

Fires of an electrical origin

Electrical arcing

Explosions caused or initiated by electricity

4. ... as far as is reasonably practicable

What you have to do to maintain a safe place will be based on an assessment of the magnitude of risks associated with your activities (hence the need for a risk assessment), as against the difficulty, time, trouble and expense of eliminating /minimising those risks. The greater the risk the less weight will be given to the cost.

Safe places of work

How do I know my 'place is safe? ... And how can I keep it safe 'at all times'?

One person's idea of 'safe' may differ from another's. That's where standards come in. By having a common set of standards that everyone – including Insurers and the criminal courts will recognise, Dutyholders can feel that as far as is reasonably practicable they have provided a safe place.

What standards determine a safe place?

As stated previously in our guide you have what the Law sets out, primarily The Electricity at Work Regulations 1989 and what is recognised as best practice, the IET 18th Edition Wiring Regulations BS 7671:2018+A4:2026.

BS 7671 is not the easiest document to digest, even for electricians. Help comes in the more digestible form of Guidance Notes. The Guidance Notes are a series of eight books issued by the IET Wiring Regulations Policy Committee to enlarge and amplify the requirements of BS 7671:2018+A4:2026. Greater detail with respect to inspection and testing and electrical drawings can be accessed via these documents with particular emphasis on Guidance Notes 1 & 3.

In short, if your installation complies with BS 7671 you can be confident you are complying with electrical safety law (EaWR). Comments in both documents confirm this. The law requires that this be the case throughout the life of the installation. What does this mean?

The 'life' of an electrical installation.

Design stage

Electrical safety must be designed in. If the original concept doesn't conform on the drawing board to accepted standards your installation is not by some miracle going to undergo a transformation and comply when it gets installed.

Whenever you have anything electrical installed, ask your designer or your electrical contractor to provide design calculations to prove that it complies with the latest standards.

You might not have the expertise to check them yourself, but at least you'll make your contractor think about what he's doing if he thinks his design will be scrutinised if anything goes wrong.

Design calculations are useful when carrying out initial periodic testing of the installation. Some clients (not many) use them to retrospectively confirm the validity of the design.

Safe places of work

Installation stage

Assuming that the design complies, always have the installation carried out by a reputable contractor or by competent members of your own staff. In the author's experience some 75% of all installations have faults, many of which carry a risk of injury or fire.

Note: The vast majority of faults were put there by an electrician (or someone purporting to be one). The installation may be a temporary one that becomes permanent; it may have been done in a rush at shutdown, or by someone simply not competent.

At the end of the installation, insist that the installer provides a full set of completed inspection and test records. The testing will confirm that it was installed in accordance with the original design (which hopefully will in itself comply).

Note: Selecting an NICEIC registered contractor is the first 'tick in the box'. If they don't perform – complain to the NICEIC. They will investigate.

Whilst in use

If the installation was designed correctly and installed in accordance with the design, in theory the only faults that should then arise should be as a result of wear and tear, deterioration and as a result of adverse environments.

Damage to equipment does happen. If it does, carry out repairs speedily before they become dangerous. If a situation is dangerous, say a broken socket that exposes the conductors for instance, repair or replace it immediately. Remember the law says it must be safe at all times.

Whilst being maintained

Electrical installations should be maintained by competent persons (see Safe People). One of the most common sights is that of a run of electrical trunking with the lid missing, or the lids or covers off conduit boxes and switches missing. These items didn't fall off themselves, they were removed for some maintenance or repair and never replaced.

These are the common faults that any non-electrical insurance surveyor can pick up on and include in his renewal report. It's a matter of good housekeeping.

When being taken out of service

Not really within the scope of this guide, but again the principles above apply to the safe decommissioning of electrical installations.

Safe places of work

So I've done all that, is there anything else?

Yes. From time to time it is essential that the installation is inspected and tested at appropriate intervals to establish its current condition. This is known as periodic inspection and testing.

But the law doesn't say anything about inspecting and testing does it?

The Memorandum of Guidance on the Electricity at Work Regulations 1989 is split into two parts. In italics is the legal narrative – the actual law. Surrounding each Regulation are guidance notes designed to assist Dutyholders in their compliance with what the Regulations are asking for.

If you look at the italicised legal text it doesn't say 'thou shalt carry out periodic inspection and testing'. It does however give guidance which as we have established earlier will be accepted by the courts as evidence of what a best practice Dutyholder should have done. If you comply with the Guidance given you have an excellent defence in the event something goes wrong.

So does the Guidance mention inspection and testing? Yes it does. After stating in Regulations 4(1) and 4(2) the requirement to ensure that an electrical installation should be designed, installed, operated and maintained in a safe manner at all times, the Guidance notes tell us how this can be demonstrated.

Paragraph 68 of the Guidance Notes states that “Regular inspection of equipment is an essential part of any preventive maintenance programme”.

Paragraph 69 then states *“Records of maintenance, including test results preferably kept throughout the working life of an electrical system will enable the condition of the equipment and the effectiveness of maintenance policies to be monitored.”*

This is called 'effective monitoring' and the Guidance categorically states that *“Without effective monitoring, Dutyholders cannot be certain that the requirement for maintenance has been complied with.”* The Guidance then refers the reader to BS7671 for further guidance as to how to carry out the inspection and testing, periodicity etc.

Why not inspect and test when the Electricity at Work Regulations 1989, Guidance Notes are advising you to do so? Do you have a better idea?

Remember what we said earlier in this Guide. Make sure that if you prefer an alternative method of compliance that it's at least as good as the method(s) recommended officially.

Safe places of work

How often should I inspect and test?

EaWR leaves that to the judgement of the Dutyholder, however Guidance note 3 to BS7671 gives a more definitive answer. The following table shows what the Wiring Regulations recommends:

Table 3.2 - Frequency of Inspection & Testing

Type of installation	Maximum Period Between Inspections
Domestic	10 Years
Commercial	5 Years
Education	5 Years
Hospitals	5 Years
Industrial	3 Years

Note:
These frequencies are the maximum recommended by the IET. Dependant on the environment the nature of use of installation and evidence from previous test records etc the frequencies may be reduced.

By carrying out a programme of Inspection and Testing Dutyholders are showing due diligence as far as their legal requirements are concerned. Doing so will satisfy the law and provide the defence that the Dutyholder *‘took all reasonable steps and exercised all due diligence in order to avoid committing an offence.’* (Electricity at Work Regulations 1989: Regulation 29)

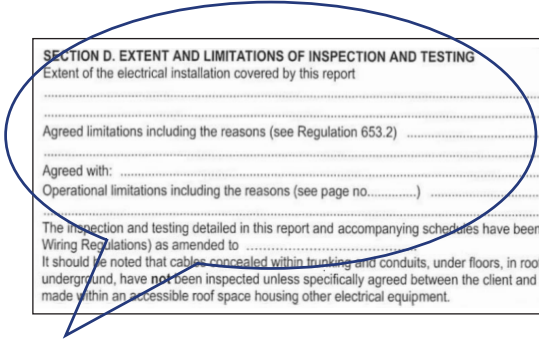
What forms should I use or expect to see from my contractor?

All reports should be in accordance with Appendix 6 of BS7671, so they can if required be used for a defence in the event of an electrically related incident in the workplace.

Standard Industry forms such as those advocated by the NICEIC and the IET have hitherto been more about numbers and test results and less about providing useable information that a Dutyholder who might not be electrical can use and draw conclusions from. There has previously been little space for commenting on the installation. As a Dutyholder you probably take one look at the mass of numbers and say - “yes but is my installation safe?” A complex set of test results doesn’t tell the layman whether it is or not. Not only that but past evidence from the NICEIC suggests that even electrical contractors struggle to get to grips with the forms.

Safe places of work

The Dutyholders name now goes on the report.



SECTION D. EXTENT AND LIMITATIONS OF INSPECTION AND TESTING
Extent of the electrical installation covered by this report

.....

Agreed limitations including the reasons (see Regulation 653.2)

.....

Agreed with:

Operational limitations including the reasons (see page no.....)

.....

The inspection and testing detailed in this report and accompanying schedules have been carried out in accordance with BS 7671:2018 (IET Wiring Regulations) as amended to

It should be noted that cables concealed within trunking and conduits, under floors, in roof spaces, and generally within the fabric of the building or underground, have not been inspected unless specifically agreed between the client and inspector prior to the inspection. An inspection should be made within an accessible roof space housing other electrical equipment.

The extent of the testing and the reasons for limiting it has to be included on the report. A name (the Dutyholder's name) goes in the section 'Agreed with'.

Why is the person whose name goes on the report on behalf of the client the Dutyholder for this activity?

Remember when we were discussing Corporate Manslaughter legislation? It was stated that senior management held responsible (the Dutyholder) was the person who organised the activity or made the decisions regarding it. The expression "Person ordering the report" on the new test report sounds an awful lot like a Dutyholder when put in that context.

OK – does it matter if I'm named as Dutyholder? –

No – provided responsible decisions are taken. Everything is fine if nothing goes wrong. You would never end up in court, your insurer would be happy and you are covered for your losses in the event of a claim.

However there are two items which form part of the Dutyholder's responsibilities which may come back to bite you. They are:

1. Who you delegate the work to – (order the testing work from)
2. The extent of testing that you the Dutyholder agree in writing

Safe places of work

• Who you delegate the testing to

Does it matter? I'm on a budget - I go for the cheapest I can get - what's wrong with that?

First, if nothing goes wrong then it may seem as though cheapest is best in these recessionary times. However if something does go wrong then the HSE's words that we asked you to remember from earlier may come back to haunt you:

"Failures by senior managers to manage health and safety adequately, including through **inappropriate delegation of health and safety matters**, will leave organisations vulnerable to corporate manslaughter/homicide charges."

If a Dutyholder orders testing to be done by an incompetent company or person simply because they tender the lowest price it may be deemed 'inappropriate delegation'. Decisions taken purely on the basis of cost may be viewed negatively by the courts.

Second, remember why you are doing it in the first place. You are doing it not only to comply with the law and insurance requirements, but you are also having the work done to see if you have a Safe Place of Work. In trying to save money, if you pay your money and the testing doesn't achieve that, you will have wasted every penny you have spent, not just the difference between the cheapest incompetent contractor and a competent one.

Do we have to get a subcontractor to do the work - Can't we do it ourselves?

Certainly - if you have the resources. Unfortunately most companies do not. Many organisations recognise the specialist nature of the work and out-source it.

The maintenance staff of most organisations are too hard pressed keeping the plant running, sometimes around the clock, to carry out an effective regime of inspection and testing.

In addition most maintenance engineers, whilst being very effective in maintenance, repairs and keeping plant running, lack the necessary skills required for inspection and testing. It is a specialist activity.

The other factor to remember is that most electrical faults were designed and installed that way - they did not deteriorate into that condition. They were probably installed under very difficult conditions by persons trying to maintain production. In addition they may well have been put there by the maintenance electricians that are now being asked to comment on their own installation.

Question -

Are you the best person to objectively report on its condition and identify faults if you were the one that put them there? Wouldn't an independent person be better?

Safe places of work

Why not my favourite local contractor?

Before employing anyone to carry out this specialist work, check the following:

- What experience do they have in Periodic Inspection and Testing (existing installations)
- What are the qualifications of their testers?
- Do they have:
 - A formative recognised electrical apprenticeship.
 - City & Guilds 2382-18 IET 18th Edition Wiring Regulations BS 7671:2018+A4:2026.
 - City & Guilds 2391-50 Initial verification and certification of electrical installations & City & Guilds 2391-51 Periodic Inspection, Testing and Certification - City & Guilds 2391-52 Initial & Periodic Inspection and Testing.
 - City & Guilds 2396-01 Design and verification of electrical installations - Formerly, 2400 and more latterly 2391-20. (Someone in the organisation should have this qualification - preferably the senior tester, who can comment on the installation and tell you if it has been designed to current standards).
- Have you seen samples of their previous work?
- Did this contractor install any of the defective work previously?

Always compare apples with apples:

- Scrutinise quotations carefully.
- Ensure that they all follow the same specification.
- Look for phrases such as “we will test 100% of 10%”.
- Make sure their staff are directly employed. Some contractors give you a price per circuit and then ‘sub it out’ at a fraction of that cost.

How about an NICEIC approved contractor?

An approved NICEIC contractor must have a Principal Dutyholder and employ one or more Qualified Supervisors. The Principal Dutyholder is a full time principal or senior manager of the business responsible for the maintenance of the overall standard and quality of the electrical installation work undertaken by the business from a particular location.

Note: Principal Dutyholders are not subject to assessment. The Qualified Supervisor is assessed as being electrically competent. He has specific responsibility on a daily basis for the safety, technical standards and the quality of the electrical installation work under his supervision. As part of the NICEIC assessment, they will have been assessed against the requirements previously listed in the contractor checklist.

Safe places of work

So if my Testing contractor is NICEIC registered is that enough?

It is the first tick in the box as some NICEIC Approved Contractors do have appropriate skills, knowledge and experience to carry out Periodic Inspection and Testing of Installations.

It is, however, the 'Dutyholder's' responsibility to ensure that individuals undertaking the inspection and testing are competent to do so.

Remember – it's your name on the test form as having appointed them

The NICEIC do a fine job in maintaining standards and their assessment is rigorous with respect to the Qualified Supervisor(s) and their level of competence. However NICEIC registration doesn't work like Gas Safe (formerly CORGI) assessment works. With that scheme the actual plumber holds the registration not the company. With the NICEIC scheme it's the company that holds the registration not the electrician or tester. The assessment does not extend to the individuals employed by the company, either as direct or sub-contract staff. Many if not most Qualified Supervisors never do any testing in the course of their duties. There is every chance that the person testing your work will not actually have been assessed by the NICEIC ever. It's not the NICEIC's fault. A 'Gas Safe type scheme' for the electrical industry would be very costly and the costs would be passed on to the client.

In order for the 'Dutyholder' to discharge his responsibilities with respect to competence, Regulation 16 (Absolute) of the Electricity at Work Regulations 1989 must be remembered: 'no person shall be engaged in any work activity where technical knowledge or experience is necessary to prevent danger or, where appropriate, injury unless, he possesses such knowledge or experience, or is under such degree of supervision as may be appropriate having regard to the nature of the work.'

By the NICEIC's own admission, a disconcerting number of electricians cannot demonstrate competence to test properly. So the Dutyholder's responsibility to employ competent persons isn't automatically discharged by employing an NICEIC registered company, it is merely advisable as the first check. -

The 'Dutyholder' must look further.

Conclusion:

- Choose a specialist testing organisation that can guarantee the competence of staff who are directly employed.
- Ask for qualifications and experience of the individuals booked to carry out work at your premises because there is now a clear distinction between an Inspector and an Electrician who undertakes inspection and testing now and again.

Safe places of work

• The extent of the testing you agree to

SECTION D. EXTENT AND LIMITATIONS OF INSPECTION AND TESTING
Extent of the electrical installation covered by this report

Agreed limitations including the reasons (see Regulation 653.2)

Agreed with:

Operational limitations including the reasons (see page no.....)

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It should be noted that cables concealed within trunking and conduits, under floors, in roof spaces, and generally within the fabric of the building or underground, have **not** been inspected unless specifically agreed between the client and inspector prior to the inspection. An inspection should be made within an accessible roof space housing other electrical equipment.

Remember on the new report it's you as Dutyholder that agrees in writing the extent of testing.

Can I do sample testing say 10 or 20%?

Again it's down to your judgement as Dutyholder. However as BS 7671 instructs, the results of previous report(s) should be considered. What if you have no previous reports? How can you decide to ignore the vast majority of circuits in an installation which have never been tested or haven't been looked at for a long time?

You are Dutyholder in charge of ordering the testing. Your testing contractor is obliged to 'admit' on the form that he has only tested 10% (many will try to pretend they are doing more). You are down on the form as having agreed the limitation. A fault occurs in the 90% that hasn't been tested and someone gets injured. You have no records to show that part of the installation has ever been tested and you consciously ignored 90% of it this time (or you didn't read the testers quote properly or didn't read the report when you signed in agreement). How can you defend yourself in court?

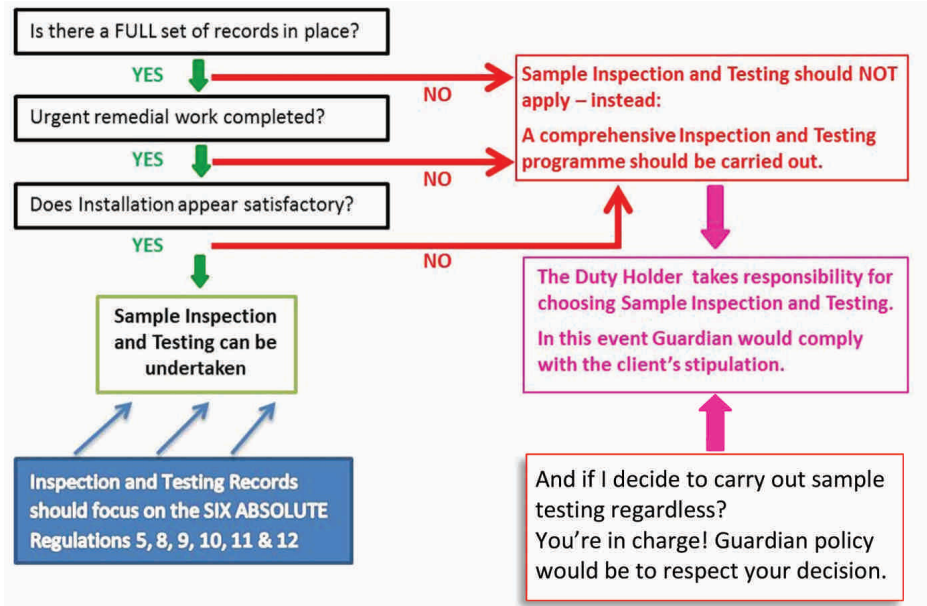
Or if the fault causes a fire, how will you explain it to your insurer?

So is 10% or some other small sample an adequate extent?

The following flow chart may help a Dutyholder to make that judgement:

Safe places of work

Sample Testing or not?



Sample Testing is a perfectly legitimate practice to undertake on an electrical installation.

However, it should not be undertaken without consulting the original Inspection and Test records.

Unfortunately there are still organisations in the UK that have no records and the more unscrupulous testing houses are still advising 'Sample Testing'.

In the event of an incident, on a part of the installation that has no records, it is not a defence for a Dutyholder to say he was wrongly advised by the contractor. Bear in mind that most contractors will suggest 10 or 20% because it makes life easier for them. It does not however tell you if your installation is safe.

Moreover, it is the responsibility of the Dutyholder, not the contractor.

“There is nothing in the world that some man cannot make a little worse and sell a little cheaper, and he who considers price only is that man’s lawful prey”. – John Ruskin

Safe places of work

Where does the notion of 10% testing come from (apart from corner-cutting testing houses)?

It does get a mention in a footnote in Guidance Note 3 of the Wiring Regulations where it passes responsibility for determining the scope and extent of the Inspection and Testing to the Inspector (contractor). The guidance note states however that the decision should be based not only on the Inspector's experience but also his knowledge of the installation and by consulting any available records.

Based on the above, ask yourself - Is it acceptable that someone with no knowledge of the installation and with **no** available records should choose to test the bare minimum mentioned in a footnote?

Case study:

The author carried out a survey recently and inspected client records constituted by a '10% testing house'. The contractors records showed that of 527 active circuits only 35 had been tested! Also, the contractor claimed to have selected the circuits to be tested 'at random', whereas in fact most were items such as "socket adjacent to the distribution board".

In other words they had cherry picked the easiest circuits!

N.B. This wasn't the work of a cheap one man band. It was carried out by one of the largest testing companies in the UK.

Sample testing is a cheap way of finding out defects in manufactured products. Here's how:

A manufacturer of widgets produces a batch of 10,000 items. How does he know how many in the batch are defective? One expensive way would be to inspect them all. A cheaper way of finding out is to select 10% totally at random and count the defects in the sample batch.

If you find say 50 defective items in the sample batch of 1000, you can be 95% confident that in the whole batch there will be 500 defective items. You can then decide if that is acceptable having only counted a 1000 instead of 10000.

Let's apply this to an electrical installation. Well let's assume that a contractor selects 10% of the circuits to test. Bear in mind it only works if they are selected purely at random - and they never are as the test case above shows.

If 20 defects are found in the 10% sample, what does that tell the Dutyholder? It tells him that in the rest of the installation there is likely to be 180 defects (200 in all) - BUT he doesn't know where they are! And unlike defective widgets, these defects won't just disappoint a customer, one of them might kill someone - and you don't know where it is! Good enough? You decide.

Safe places of work

That's ok in theory, but I can't stop production. How can I discharge my responsibilities?

Production issues are a legitimate concern. Is there a way round them? – What about this new American idea which is being sold to a number of franchise testing houses in the UK? It claims to be non-intrusive and amongst other things is based on diagnostics from ultra-sonic readings taken at site. Surely anything that proves my installation is safe without powering down must be worth considering?

Indeed it is – providing it works and it satisfies electrical safety law such as EaWR.

First, ultrasonic inspection of distribution equipment and protective devices to identify noise/chatter of devices is unproven technology. Manufacturers provide various tables of characteristics for their devices but do not provide details of normal operating noise. Without this data it isn't possible to draw stable conclusions from the readings derived.

Second, does it satisfy legal requirements here in the UK?

The service has been devised in the US to comply with US standards (NFPA70E), not British.

There are some elements of the service that have merit. Unfortunately absolute requirements of the Electricity at Work Regulations 1989 (EaWR), which is UK law and must be complied with are not covered. These include:

- Diagrams or charts
- Composition of circuits
- Identification of protective devices for:
- Condition Shock protection
- Isolation and switching
- Method used for fault protection
- Nature of the electrical supply
- Earthing arrangements
- Measured Z_e/Z_{db}
- Main protective bonding presence and continuity test
- Circuit protective conductor continuity
- Measured Z_s for circuits
- Alterations and additions

Safe places of work

A non-intrusive regime answer. - how it compares legally with full inspection and testing

Full Access - Inspection & Testing	Restricted Access – Inspection & Testing (Unable to Isolate or Power Down)
1. Comprehensive visual inspection (Regulation 6, 10, 15) a. The whole of the installation and produce schedule of observations categorised C1, C2, C3, FI 2. Protective conductor continuity (Regulation 8) a. Socket outlet connections b. Can also be proven conducting earth fault loop test c. Accessible exposed conductive parts of current using equipment and accessories d. Can also be proven conducting earth fault loop test e. Generally, accessibility may be considered to be 3M from floor or where a person may stand 3. Bonding conductor continuity (Regulation 8) a. All protective bonding conductors b. All necessary supplementary bonding conductors 4. Ring circuit continuity (Regulation 4(1), 4(2)) a. Where there are proper records of previous tests, this test may not be necessary. Test carried out if there is documentation that indicates there may have been a change to the circuit. 5. Insulation resistance (Regulation 7) a. Between line conductors and line conductors and earth at all final distribution boards b. At main and sub-main distribution panels with final circuit distribution boards isolated from mains 6. Polarity (Regulation 9) a. At origin of installation b. Distribution boards c. Accessible socket outlets d. Extremity of radial circuits 7. Earth electrode resistance (Regulation 8) a. Test each rod or group of rods with test link open and installation isolated 8. Earth fault loop impedance (Regulation 8, 11) a. At origin of installation b. Distribution boards c. Accessible socket outlets d. Extremity of radial circuits 9. Prospective fault current (Regulation 5) a. At all main and sub-distribution 10. Residual current device operation (Regulation 8, 11) a. At distribution boards as part of supplemented circuit protection b. At self-contained socket outlets 11. Functional tests a. Test button on RCD's and RCBO's b. Test button on AFDD's c. Operation of isolators etc 12. Single line diagram and labelling of equipment (Regulation 12) a. For isolation purposes and expansion of system	1. Comprehensive visual inspection (Regulation 6, 10, 15) a. The whole of the installation and produce schedule of observations categorised C1, C2, C3, FI 2. Protective conductor continuity (Regulation 8) a. Socket outlet connections b. Can also be proven conducting earth fault loop test c. Accessible exposed conductive parts of current using equipment and accessories d. Can also be proven conducting earth fault loop test e. Generally, accessibility may be considered to be 3M from floor or where a person may stand 3. Bonding conductor continuity (Regulation 8) a. All protective bonding conductors b. All necessary supplementary bonding conductors 4. Polarity (Regulation 9) a. At origin of installation b. Distribution boards c. Accessible socket outlets d. Extremity of radial circuits 5. Earth electrode resistance (Regulation 8) a. Test each rod or group of rods with test link open and installation isolated 6. Earth fault loop impedance (Regulation 8, 11) a. At origin of installation b. Distribution boards c. Accessible socket outlets d. Extremity of radial circuits 7. Prospective fault current (Regulation 5) a. At all main and sub-distribution 8. Residual current device operation (Regulation 8, 11) a. At distribution boards as part of supplemented circuit protection b. At self-contained socket outlets 9. Functional tests (asfarp) a. Test button on RCD's and RCBO's b. Test button on AFDD's c. Operation of isolators etc 10. Thermal imaging a. The IET recognise that the size and complexity of installations is increasing making it difficult to isolate supplies. Nevertheless, it remains necessary to confirm the continuing suitability of such installations for use. Thermal imaging may form part of a planned maintenance regime to ensure continued safe operation of an installation. This is achieved by identifying 'hotspots' that cannot be identified by visual inspection. 11. Single line diagram and labelling of equipment (Regulation 12) a. For isolation purposes and expansion of system

Note: Non-intrusive method complies with all the Absolute Regulations provided feasible plans are in place to carry out intrusive elements when reasonably practicable (planned shut-downs)

Safe places of work

PANEL RISK ASSESSMENTS - limitations with Inspection & Testing

As comprehensive as inspection & testing is, it does have limitations. The typical EICR scope ends at the incoming source of supply (main isolator) to a control panel, or MCC for machinery, which usually disregards panels from any testing program. With panels being a grey area for an EICR, it means the Dutyholder, or contractor is unable to determine the condition and safety of a panel before any potential access for maintenance or fault finding is required. The Dutyholder is then unwittingly exposed should there be a breach of regulation.

Panel Risk Assessments bridge the unknown between the BS7671 and other British safety standards such as Electrical Equipment of Machines covered by the BSEN60204. Often panels are installed, modified, and replaced without the relevant maintenance or remedial documentation being produced. Without controlled documentation in place, a Dutyholder would struggle to demonstrate compliance in the event of an EaWR 1989 breach.

Remember – In the eyes of the HSE, you, the Dutyholder, are guilty until you can robustly prove otherwise.

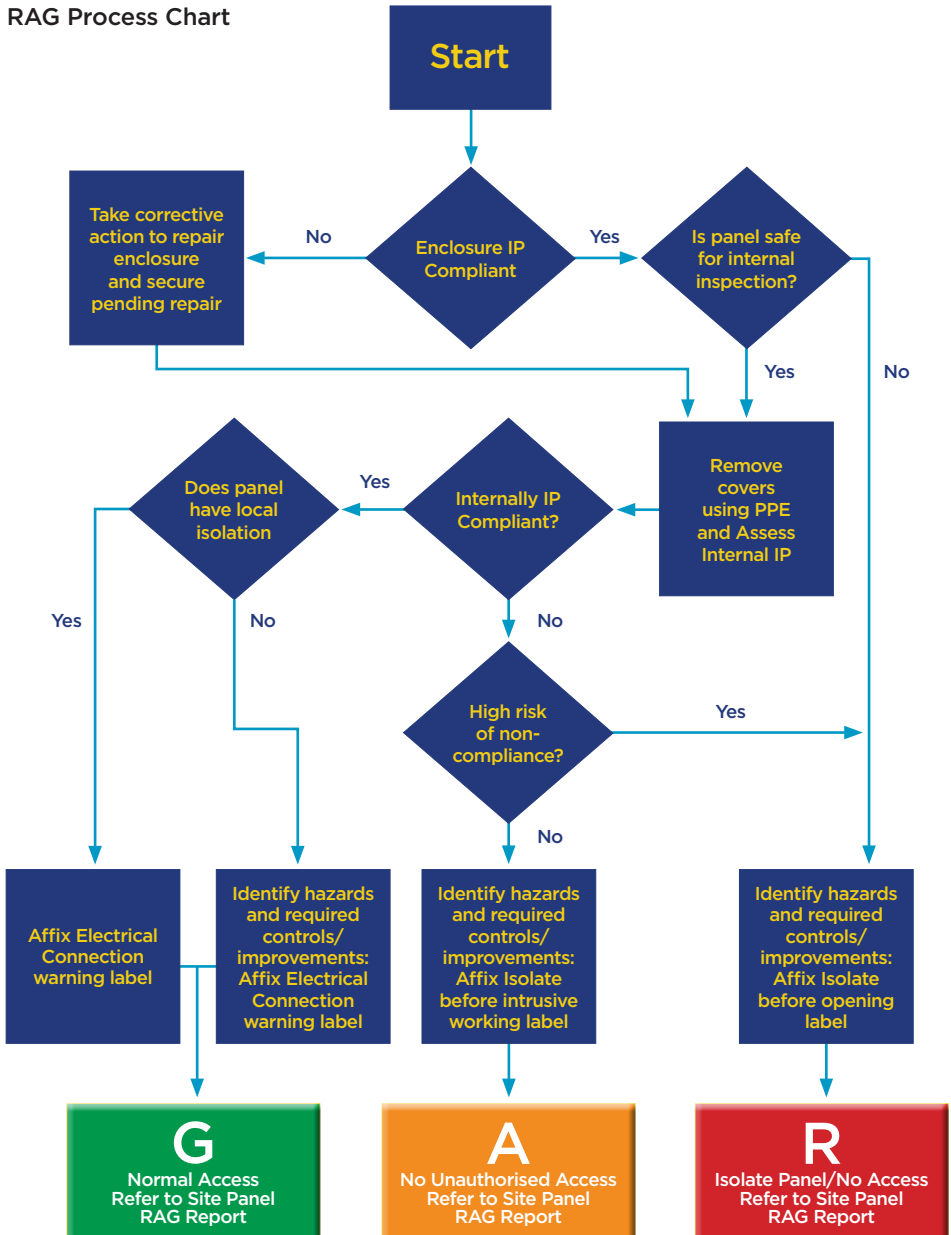
Guardian, along with industry leaders have developed a program of works for panel risk assessments, enabling Dutyholders to continuously maintain full control of this particular aspect of electrical safety.

The PRA program of work includes:

- 100% (ASFARP) Inspection of the Low Voltage Category 1 to 4 panels in accordance with your request, undertaken by our fully qualified electrical engineers.
- PRA Paperless Reports and all associated documentation uploaded to TraQ-it®.
- ID labelling system on all panels – inclusive of QR codes affixed to panels for instant site access to relevant records via TraQ-it®.
- **RED**, **AMBER** and **GREEN** labelling system, that will enable instant visibility in identifying hazards associated with the panel, and any precautions that need to be taken upon entry.
- Continuous management by Guardian of panel updates/amends via TraQ-it®.

Safe places of work

RAG Process Chart



10. Safe people at work

So far you've tackled two of the three building blocks of safety. You've considered how you do what you do and where you do it. They are the two most controllable aspects. Now to consider who does it for you.

What makes a 'safe person'. A competent person is generally more likely to be a safe person. What makes a 'competent' person?

Regulation 16 of the Electricity at Work Regulations 1989 states that:

"No person shall be engaged in any work activity where technical knowledge or experience is necessary to prevent danger..., unless he possesses such knowledge or experience, or is under a degree of supervision as may be appropriate having regard to the nature of the work."

Competence is a 'cocktail' of items which includes:

- Knowledge - of Electricity.
- Experience - of electricity including the type of system being worked on.
- Education - formative years preferably apprentice trained.
- Training - to latest relevant standards.
- General ability to recognise danger and when it is safe to work.

Measures necessary to ensure competence:

- Ensure staff are conversant with your Safe Working Procedures, Risk Assessments, Permits to Work etc.
- Ensure staff are experienced and trained for the job at hand, or have appropriate supervision.
- In respect of electrical installation practice, alterations & amendments - ensure they are qualified to BS 7671:2018+A4:2026 18TH Edition (C&G 2382-18). NB. HSE Inspectors look for this first.
- Ensure they are qualified to test the electrical work they have installed. (C&G 2391-50, 2391-51 & 2396-01 - See Details Below).
- Ensure checks and balances are in place to verify competence of contractors.
- Monitor, audit & review all of the foregoing.

If you contract out your electrical services including inspection and testing the onus is on your contractor to demonstrate competence and for you to ask to see it. Ask for evidence of competence of their staff. Get references for the work they have done in the past.

If you directly employ the staff involved, the onus is on you to demonstrate their competence. Remember only the employer can declare competence of a member of staff. You cannot delegate that responsibility to anyone else such as a Training organisation or Safety specialists.

Safe people at work

Relevant City & Guilds courses associated with above: 18th Edition Wiring Regulations:

City & Guilds 2383 Level 3 Award in the requirements for electrical installations BS 7671: July 2018.

Inspection & Testing / Design Courses:

City & Guilds 2392-10 Level 2 Certificate in fundamental inspection, testing and initial verification.

City & Guilds 2391-50 Level 3 Award in the initial verification and certification of electrical installations – Previously included as part of 2391-10.

City & Guilds 2391-51 Level 3 Award in the periodic inspection, testing, and certification of electrical installations – Previously included as part of 2391-10.

City & Guilds 2396-01 Award in the design and verification of electrical installations – Formerly, 2400 and more latterly 2391-20.

Further training that may be required:

- Safe Isolation of Electrical Energy and Proving Dead
- Machine Safety
- Risk Assessment
- PLC Training and Support
- Practical Workshops/On - site Training
- Electrical Equipment Testing
- Inspection, Testing and Certification
- Design and Verification of Electrical Installations
- Electrical Machine Safety
- Electrical Risk Assessment
- Electricity at Work Regulations course
- Dutyholders & Electricity course
- Electrical Safety Awareness
- 4 Day Basic Electrical
- Management of Health & Safety
- NEBOSH, The National General Certificate and Diploma (advanced)
- IOSH and equivalent courses in Managing Safety.

11. Staying in Control

You've gone to all this trouble – you've developed your systems, made your place of work safe and declared your people safe and competent.

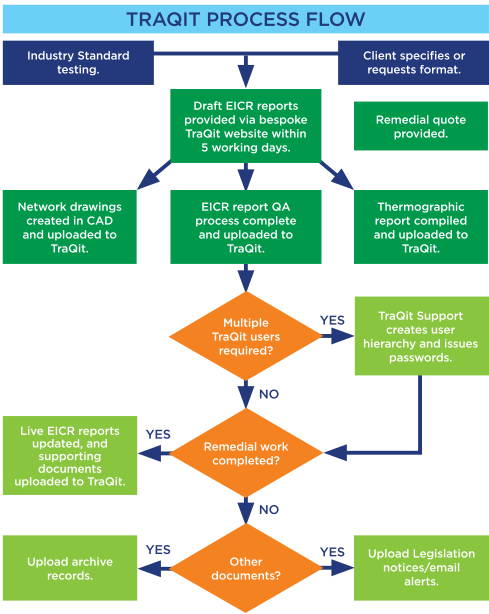


How can you keep in control of all the records? How can you keep up to date?

Lose the Paperwork! - Not literally – you've paid for it!

Ask yourself as a Dutyholder - Do I feel in control or confident that my records are accurate and up to date? Over the years we've helped hundreds of clients to get in control of their electrical compliance only to go back say 3 years later and find that records have been lost, not changed, not updated, not consolidated – in short control has been lost.

In such circumstances there would be no robust defence in the event of an incident. Many clients have no choice but to start again. In countless cases, clients have spent serious money with a number of different contractors and their records are in a mess.



From the moment you start to constitute records they are put on the web site.

Drawings are uploaded in accordance with how your network is laid out.

Perhaps for the first time you see where all your equipment is.

← The system works like this

It's properly labelled and identified and available to all authorised users.

After that, everything that happens to the system, be it additions, extensions, changes, maintenance, inspection and testing work – it all gets uploaded to site and is stored against the correct Distribution Board, transformer, room, floor, building etc. etc.

You choose how you want to view it.

Staying in Control

Whenever changes take place, you can either edit the record yourself or take advantage of Guardian's free editing service available to all **TraQit®** users. An automated monthly email is issued, asking you to forward your changes, so we can update your records.

Version history keeps the record of maintenance that EaWR requires.

You close the loop and always stay in control. Plus you don't have shelves full of paper files that deteriorate and get lost. They're always available to everyone who needs to see them.

Fixed Wiring Records on the interactive web site

Access:

- Drawings
- Test results
- DB details
- Defects
- Remedials
- Certification
- Contractor Records
- Training Records
- Thermographics
- Any other test



Graphical up to date evidence of progress towards compliance is always on top. As defects completed, associated record is edited and graphic reduces outstanding defects showing work you have done. Multi - sites can show a global view or an individual site view.

Electrical Equipment Testing Records on the interactive web site



Control of Electrical Equipment Testing is always difficult. Here graphical data shows failed items, and items overdue for testing. Hierarchy control of access means multi - sites can log in for a companywide view or an individual site view.

Using modern on line methods saves you money. How?

For a start, TraQit® is free, made possible because Guardian have reduced the back office overhead associated with data input and invested in technology. By having editing rights by taking advantage of Guardian's free editing service, you never need to be out of date.

Once up to date Dutyholders can justifiably reduce the level of testing in future years. 'Sample testing' then becomes a cheaper but legally justified method of discharging your responsibilities as a Dutyholder.

Note: No other on line system apart from TraQit® hosts truly **editable** records.

Question - Someone is standing in front of a Distribution Board say in my building. Can my engineer, electrician or subcontractor see the records and status of the Distribution Board right there and then without trawling through records back at the Office.

Answer - YES. How? - By using the very latest technology in conjunction with TraQit® **Here's how.....**

Staying in Control - QR Codes

QR codes working in tandem with TraQit®, allow reports & DB Schedules to be instantly accessed via smart handheld devices.

A significant time saving benefit for client maintenance teams, contractors & associated trades working on site.



First used in Japan for the automotive industry, a QR Code (abbreviated from Quick Response Code) is a machine-readable code consisting of black and white squares, typically used for storing information such as URLs (website addresses) for reading by the camera on a smartphone.

The Guardian Electrical Compliance TraQ-it® website allows customers to view their fixed wire electrical installation condition reports, network drawings and thermographic surveys etc.

Customers scan QR codes, fitted to distribution boards by Guardian Electrical Inspectors, giving instant access to the relevant electrical installation condition report.

How does it work?

Each individual Distribution Unit subjected to Inspection & Testing, Drawing or Thermographic Survey, will have a visible and accessible QR (Quick Response) code affixed to the relevant Distribution Unit.

It's important to note that QR codes affixed by Guardian Inspectors will only work via the TraQit® website. Simply scan over the QR Code, input TraQit® logon details, and the Electrical Installation Condition Report for the relevant Distribution Unit will open via your TraQit® website. Similarly you can access the Drawings and certificates of maintenance associated with the Board.

At Guardian, we are always looking to progress service delivery and efficiency through technology. Although not legally required by EaWR 1989, QR Codes are considered a 'nice to have' and are proving extremely popular in the industry.

The adoption of QR Codes for customers is intended to improve the efficiency of both office and field-based disciplines.

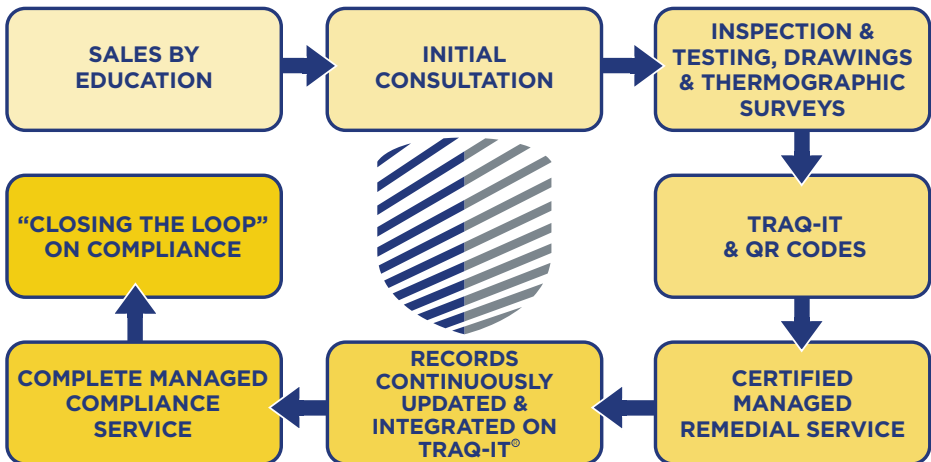
12. A Complete Managed service

Our **Complete Managed Compliance Service** has evolved over a 25-year period, considering client feedback, personal experience of HSE incidents and as a preferred supplier for AXA Insurance.

In most cases, this has led to partnering with the majority of our clients and in consequence, a 93% business retention rate over the last 3 years.

Benefits

- Not a tick in the box testing, guaranteeing a feeling of management and control
- Instantly accessible and independently managed, current and historical records via TraQit®
- Satisfying the compliance requirements of the HSE and demands of the Insurer
- Continuous updating of records to satisfy internal or external audits
- Accurate records available for company stakeholders & electrical installation projects
- Costs are justifiably reduced for future cycles of testing.



13. Who's written this Guide? - about the authors.

The primary authors of this Guide are Directors of Guardian Electrical Compliance Ltd.

JOHN QUICK **DIRECTOR CHAIRMAN - GUARDIAN**

John is the Chairman of Guardian Electrical Compliance Ltd.

John has over 40 years' experience in the Electrical Contracting and Electrical Safety industry. Over half of that working experience has been at Director Level and 12 years has been at Managing Director level. He has had oversight of multi million pound businesses.

Educated to HNC standard and holder of NEBOSH Certificate John joined the Lowe Group (later to become NECTA) as Group Managing Director in 1999 and thereafter he and his colleagues built up the business into a highly respected and profitable organisation, specialising in the provision of complete electrical safety services for a multitude of blue chip clients.

IAN CARNALL IENG MIET **MANAGING DIRECTOR - GUARDIAN**

Ian is the Managing Director of Guardian Electrical Compliance Ltd.

Ian started his working life in 1977 as an Indentured Electrical Apprentice with N.G.Bailey, culminating with a HNC/Full Technological Engineering Certificate in 1982.

In 1996 he became the MD of the National Association of Professional Inspectors & Testers, which today has nationwide membership and is a Government sponsored 'Competent Persons Scheme' for Electrical Safety. A member of the IET, Ian joined the Lowe Group (later to become NECTA) in 1998 as MD, with the specific task of initiating and growing a market leading Electrical Safety Department. Along the way Ian and his colleagues were able to assist many prestigious clients such as BOC, AXA Insurance etc. to successfully address electrical safety.

About the authors.

ERNIE WALKER DIP.EE, MIET
NON-EXECUTIVE DIRECTOR - GUARDIAN

Ernie joined the Health and Safety Executive (HSE) in 1976 as an Electrical Inspector, later becoming Senior Electrical Inspector covering the North East, with a short spell in Sheffield and Humberside. In 1986, he left the HSE and joined a multi-national organisation, dealing predominantly in risk management of major hazard plants throughout the world (including offshore and large chemical installations), principally South America and the Middle East. His position was Risk Analysis Manager. Subsequently, he began to work for himself as a Consulting Engineer, primarily involved in risk assessment, inspections of electrical installations, training and legal involvement for Civil Court cases. He found kindred spirits in the Directors of Guardian being drawn to their professionalism and philosophy and happily joined them as a non-executive Director of the Company. At Guardian he redesigned his famous 'Safe Working' flowchart which now adorns many a maintenance workshop/substation wall.

14. Guardian Expertise

Guardian Electrical Compliance Ltd, are one of the UK's leading providers of electrical safety services, specifically inspection and testing of fixed installations. Guardian offer legislative & technical support for Dutyholder's to ensure that their legal requirement to comply with the law is continually maintained.

Guardian deliver, Fixed Wiring Inspection & Testing programmes, nationwide, for many Blue Chip Companies and Public Sector Organisations, with experience across a variety of industries and working environments, from education through to manufacturing and production sites.

The authors are continuing a unique tradition not available elsewhere through the provision of advice, consultancy, technical seminars and support to readers of their literature.

They routinely:

- Write guidance for the industry on Dutyholder responsibilities.
- Support Insurance companies on legislative issues.
- Lecture on electrical safety via UK Seminars typically to audiences of Health & Safety and Senior Electrical Engineers.

We hope this Guidance proves useful in helping you to discharge your Dutyholder responsibilities.

Note:

Whilst the authors of this document are confident as to its reliability and authenticity, it is intended to be for guidance purposes only and *does not constitute legal advice*. In the event of prosecution or other legal difficulties, always consult your legal advisor

If you wish to comment about anything you have read in this Guide, or if you have any further Dutyholder questions, please contact the authors at info@guardianelectrical.co.uk

Notes

Notes



SAFE PEOPLE | SAFE PLACES | SAFE SYSTEMS

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Issue: March 2026

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