

23 Electrical safety

This chapter is split into two parts:

Part 1: Directive. This part provides direction that you **must** follow to help you comply with (keep to) health and safety law, Government policy and Defence policy.

Part 2: Guidance. This part provides the guidance and good practice that **should** be followed and will help you to keep to this policy.

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Amendment record

This chapter has been reviewed by the Directorate of Defence Safety (DDS) together with relevant subject matter experts and key safety stakeholders. Any suggestions for amendments should be sent to COO-DDS-GroupMailbox@mod.gov.uk.

Version No	Date Published	Text Affected	Authority
1.2	Oct 20	Interim update post-handover of policy from DSA to D HS&EP	Dir HS&EP
1.3	15 Nov 24	Review and release of two-part chapter structure.	DDS

Terms and definitions

The following table sets out definitions of some of the key terms used in this chapter. The general safety terms and definitions are provided in the [Master Glossary of Safety Terms and Definitions](#) which can also be accessed on [GOV.UK](#).

Accountable person	The person whose terms of reference state that they are responsible for making sure there are suitable and sufficient systems in place to control health and safety risks in their unit, estate (site) or platform. This term is used in place of CO, HoE, OC, Station Commander and so on, or as decreed by the Defence organisations.
Commander	This is generally a military person responsible for planning activities, supervising activities, and making sure that personnel under their area of responsibility are safe. This term refers to a role rather than the rank of Commander, and it can be a permanent or temporary role (for example, lasting for the duration of a training exercise). In parts of Defence this person could be referred to as a 'responsible person.'
Competent person	A person who has the training, skills, experience, and knowledge necessary to perform a task safely, and is able to apply them. Other factors, such as attitude and physical ability, can also affect someone's competence. (See www.hse.gov.uk/competence/what-is-competence.htm for information on competence.)
Electrical Testing	Electrical testing is a visual and physical evaluation of electrical equipment or systems and must be performed by a competent person, who is suitably qualified and experienced at conducting Electrical Equipment Testing (EET) and using EET equipment.
Electric Vehicle (EV)	An Electric Vehicle (EV) is defined as a vehicle that is solely powered by an electric motor that draws electricity from a battery and is charged from an external source. Usually EVs are powered by Lithium-Ion (Li-ion) batteries and include but not limited to electric cars, trucks and coaches.
Inspection	Normally a visual check of the current condition of the electrical equipment, checking for clear signs of damage or other signs of hazardous wear and tear. This does not have to be performed by a qualified electrician but should be conducted by a competent person.
Powered Transporters	A personal mode of transport that is powered by an electric motor that draws electricity from a battery and is charged from an external source. Powered transporters are often powered by Lithium-Ion (Li-ion) batteries and can include e-bikes, e-scooters, e-hoverboards, e-golf carts, e-wheelchairs, e-mobility aids and so on.

Manager	A person responsible for managing or supervising staff, planning activities, and making sure that personnel under their area of responsibility are safe. This could be a permanent or temporary role, and in parts of Defence this person could be referred to as a 'line manager,' a 'responsible person' or a 'delivery manager.'
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Must and should

Where this chapter says **must**, this means that the action is a compulsory requirement.

Where this chapter says **should**, this means that the action is not a compulsory requirement but is considered good practice.

Scope

The policy contained within this chapter:

- a. applies to all those employed by Defence (military and civilian) including those under the age of 18 (for example recruits and apprentices).
- b. applies to all those working on behalf of, or under the supervision of Defence (for example, contractors or visitors).
- c. applies to all Defence activities carried out in any location (UK or overseas) and at all times of the year.
- d. is not written for young persons in the cadet forces, Defence-run schools, nurseries and so on; those organisations **must** maintain their own safety policies and governance and **must** provide statutory compliant infrastructure and appropriate safe systems of work. They may use material from this chapter as a reference point, but where appropriate their respective policies **should** be adapted to meet the needs of young persons and to follow any applicable Department for Education guidelines or legislation.

Assurance

The application of the policy contained within this chapter **must** be assured (that is, its use **must** be guaranteed). As part of their overall assurance activity, the commander, manager, or accountable person **must** make sure that this policy is followed and put into practice effectively. Assurance **must** be carried out in accordance with JSP 815 (Defence Safety Management System) Volume 2, Element 12 - Assurance.

Alternative acceptable means of compliance

This policy is mandatory across Defence, and the only acceptable means of compliance (AMC) is attained by following the directive set out in this chapter. However, there may be circumstances where a small number of military units may be permanently unable to comply with (keep to) parts of the policy. In such circumstances an alternative AMC process is set out in the [JSP 375 Directive and Guidance](#).

Part 1: Directive

Introduction

1. This chapter sets out the Defence policy and guidance for electrical safety which includes the management, maintenance and safe use of electrical equipment and systems¹ on the Defence estate². It outlines how Defence **must** comply with the relevant safety legislation and how it will apply safe systems of work across its estate.

2. This chapter provides the direction and guidance for the use, maintenance and testing of Extra Low Voltage (ELV) electrical equipment and systems on the Defence estate. Further rules, and procedures for carrying out 'high-risk' electrical activities on Low Voltage (LV) or High Voltage (HV) electrical equipment or systems on the Defence estate are set out in JSP 375 Volume 3, Chapter 3 ([Electricity](#)). High-risk electrical activities are defined as activities which may expose personnel to live electrical conductors in LV or HV electrical equipment and systems that are permanently connected to an electricity distribution system. The table below shows the general voltage ranges and which parts of JSP 375 applies.

Type of Voltage	AC Range	DC Range	JSP 375 location
Extra Low Voltage (ELV)	<50v	<120v	Volume 1, Chapter 23
Low Voltage (LV)	50v - 1,000v	120v -1,500v	Volume 1, Chapter 23 and
High Voltage (HV)	>1,000v	>1,500v	Volume 3, Chapter 3

3. This chapter should be read in conjunction with other JSPs, International Standards, British Standards, and Defence Standards that contain requirements for electrical safety.

4. There are many sources of electrical energy within the workplace, from small batteries in electrical equipment or systems, through to power distribution systems at ELV, LV, HV and up to static electricity and lightning. Variations in the voltage, current and the frequency of the electricity affects the way in which the electrical energy will act, but basically there are common dangers associated with all the different forms of electricity.

5. The dangers from electricity include the risk of electrical burns, electric shock, electrocution, fire and even explosion in extreme circumstances. A person forming a path for an electrical current to flow will suffer an electric shock or burn. The severity being dependent on the nature of the electricity, the duration of the contact, the amount of current which flows and the route it takes as it passes through the body. Susceptibility to electric shock is increased if a person is in good electrical contact with earth. This **should** be taken into account when using electricity in damp / wet conditions or in conducting locations such as inside a metal tank.

¹ "Electrical systems" means an arrangement of devices that an electric current can flow through when connected to a power source and includes equipment with a socket and also equipment that is wired directly into mains.

² The Defence estate is all Defence owned or administered establishments and infrastructure assets, this includes the Defence training estate, accommodation such as Single Living Accommodation (SLA) and Service Families Accommodation (SFA) and, platforms such as ships and submarines.

6. The first response treatment for patients that have or are suffering with electric shock can be very different from a normal first aid scenario, for example never touch a person undergoing electric shock as the power source may still be present and you too could become a victim.

7. The Health and Safety Executive (HSE) have stated that each year they receive many reports of workplace accidents involving electric shocks or burns. There are also a number of electricity related safety occurrences reported in Defence each year. An electrical accident may result in a fatal electric shock, serious injury, or a major fire affecting the whole premises. Most electrical accidents occur because people are working on or near electrical equipment:

- a. that is thought to be dead (no electrical current is present), but which is still live (an electrical current is present);
- b. that is known to be live but those involved do not have adequate training and / or experience;
- c. with a lack of supervision and / or poor planning;
- d. when using equipment that is not appropriate; or knowingly taking unnecessary risks (e.g., not following a Safe System of Work or permit to work).

8. A significant percentage of fires on the Defence estate are either started by electrical faults or the misuse of electricity. Fires may be started by:

- a. overheating of electrical equipment / systems due to overloading;
- b. faulty electrical equipment;
- c. the leakage of electrical current due to poor, inadequate or faulty insulation;
- d. overheating of flammable materials placed too close to electrical equipment which is otherwise operating normally; and
- e. the ignition of flammable materials in the vicinity of electrical equipment caused by arcing or sparking.

9. Nearly a quarter of reported electrical accidents in the UK involved poorly maintained electrical equipment as a major cause. The recommended maintenance strategy is based on a straightforward, inexpensive system of visual inspection that can be undertaken by most members of staff without specialised training; the Health and Safety Executive (HSE) have estimated that around 95% of faults or damage could be identified this way.

10. The management, use and maintenance of electrical equipment and systems by Defence personnel and on the Defence estate **must** be carried out in compliance with the Electricity at Work Regulations 1989 or the Merchant Shipping and Fishing Vessels (Provision and Use of Work Equipment) Regulations 2006 ([MGN 331 \(M+F\) Regulation 1](#)) as appropriate.

Key legislation

11. Health & Safety legislation requires employers to make sure, so far as is reasonably practicable, the health, safety and welfare of their employees and anyone else who may be affected by a work activity. In line with the Secretary of State's (SofS) for Defence HS&EP Policy Statement these requirements are to be put in place and complied with for all Defence activities, in the UK and "overseas we will comply with the laws of Host States, where they apply to us, and in circumstances where such requirements fall short of UK requirements, we will apply UK standards so far as is reasonably practicable to do so".

12. The key legislation (in this chapter referred to as 'legislation') that applies to electrical safety is the [Electricity at Work Regulations 1989](#). The key legislation that applies to equipment in the workplace is the [Provision and Use of Work Equipment Regulations 1998 \(PUWER\)](#), for Defence this set out in JSP 375 Volume 1, Chapter 22 ([Work Equipment](#)).

Policy Statements

13. Defence has established the following policy statements, which **must** be followed.

- a. **Policy Statement 1.** The accountable person **must** make sure that suitable procedures are in place to inspect, test, and maintain all electrical equipment and systems being used on the facilities or by personnel under their area of responsibility and to make sure that records of this are maintained.
- b. **Policy Statement 2.** The accountable person **must** make sure that responsibility for electrical equipment and systems, including the point of demarcation, are clearly defined, and documented where infrastructure or equipment is managed, owned and / or maintained by a third party.
- c. **Policy Statement 3.** Commanders, managers, and accountable persons **must** make sure that risk assessments consider potential electrical hazards for all personnel working on, near or using electrical equipment or systems under their area of responsibility.
- d. **Policy Statement 4.** Accountable persons **must** make sure that the safety hazards associated with the use, charging, transportation, and storage of Electric Vehicles (EVs), Powered Transporters (PTs) and other Lithium-ion power sources, are identified and managed on the Defence estate under their area of responsibility.
- e. **Policy Statement 5.** Commanders, managers, and accountable persons **must** make sure that procedures are in place for the provision of suitable and sufficient information, training, and where appropriate supervision, for working with electrical equipment and systems for the personnel under their area of responsibility.
- f. **Policy Statement 6.** All personnel **must** comply with policy, information, instruction, and training provided by commanders, managers, accountable persons, local procedures and with manufacturers safety instructions for the safe use of electrical equipment and systems.

Policy Statement 1

The accountable person **must** make sure that suitable procedures are in place to inspect, test, and maintain all electrical equipment and systems being used on the facilities or by personnel under their area of responsibility and to make sure that records of this are maintained.

14. The accountable person **must** make sure that all electrical equipment and systems that come under their area of responsibility are regularly inspected, tested and maintained by competent persons, to the correct standard, and that records of this are retained.
15. All electrical equipment and systems **must** be inspected, tested, used, stored and maintained in accordance with the manufacturer or industry guidance, so that they are safe to use and are kept in a safe condition as required by legislation.
16. Inspection and test **must** be used to determine whether equipment or systems are fully serviceable or if remedial action is necessary. Some ELV or battery-operated equipment does not require testing; however, mains operated battery chargers may need to be subject to test or inspection (guidance on this can be found in Annex A to this chapter).
17. Appropriate safety equipment and Personal Protective Equipment (PPE) **must** be used by competent persons when inspecting, testing, and maintaining electrical equipment and systems, to minimise electrical hazards. Any safety equipment provided for the purpose of protecting persons at work on or near electrical equipment and systems **must** be suitable for the use for which it is provided, be maintained in a condition suitable for that use, and be safely used.
18. The installation, operation or modification of electrical equipment or systems **must** not have adverse effects on other existing electrical equipment or systems or introduce any safety risks that cannot be mitigated.
19. Electrical equipment that generates heat or produces sparks **must** not be placed where either the heat emitted, or sparking could lead to the uncontrolled ignition of any material.
20. Electrical equipment and systems **must** be sufficiently isolated (made dead) before maintenance or repair work is undertaken on them, unless the competent person deems it necessary to undertake such activities with the equipment or system in a live state and with all necessary safety measures in place. Precautions **must** be made to prevent electrical equipment or systems, which have been made dead, from becoming live again whilst work is carried out on or near them.
21. Accountable persons **must** make sure that, so far as is reasonably practicable, there is adequate working space, means of access and lighting where work is taking place on electrical equipment or systems, to prevent the risk of injury.
22. Before electrical equipment or systems are decommissioned, they **must** be disconnected from all sources of supply and isolated.

Policy Statement 2

The accountable person **must** make sure that responsibility for electrical equipment and systems, including the point of demarcation, are clearly defined, and documented where infrastructure or equipment is managed, owned and / or maintained by a third party.

23. The accountable person **must** make sure that where infrastructure or equipment is managed, owned and / or maintained by a third-party organisation (for example Maintenance Management Organisation, project team, external contractor) that the point of demarcation (and responsibility) is agreed (for example at the equipment isolator switch, plug, or power distribution board), is clearly defined and documented.
24. The accountable person **must** make sure that effective two-way communication exists with any such third-party organisations (as detailed in the Policy Statement) to provide assurances that all electrical systems and / or installed equipment are regularly tested, inspected and maintained to the correct standard.
25. The electrical equipment, installation, operation and maintenance service provider **must** provide assurance to the accountable person that all electrical equipment and systems for which they have ownership and / or maintenance responsibilities are regularly tested, inspected, and maintained to the correct standard.
26. The relevant testing and inspection requirements **must** be adhered to and where necessary records retained and provided to the accountable person when required. Any electrical equipment or system which is considered to be in a dangerous condition **must** be reported without delay by the person undertaking the inspection to the accountable person who will take appropriate action.
27. So that equipment remains safe under prospective fault conditions³, equipment **must** be selected by a competent person with the knowledge required to take into account the fault levels and the characteristics of the electrical protection which has been provided for the purpose of interrupting or reducing fault current.
28. The maintenance and repair of explosion-protected equipment **must** only be conducted by a competent person who works in explosive atmospheres. As a minimum, they should be a qualified CompEx electrician / engineer for the appropriate discipline relevant to the environment of the explosive atmosphere.
29. The Service, Infrastructure or Equipment Provider **must** make sure that every joint and connection in an electrical system is mechanically and electrically suitable for use.

³ A fault condition occurs when one or more electrical conductors short to each other or to ground.

Policy Statement 3

Commanders, managers, and accountable persons **must** make sure that safety risk assessments consider potential electrical hazards for all personnel working on, near or using electrical equipment and systems under their area of responsibility.

30. Risk assessments **must** be conducted for all electrical hazards in the workplace in accordance with JSP 375 Volume 1, Chapter 8 ([Safety risk assessment and safe systems of work](#)). It is the responsibility of commanders, managers, and accountable persons to make sure that risk assessments consider potential electrical hazards for all personnel working on, near or using electrical equipment and systems under their area of responsibility. This responsibility extends to anyone who may interact with the equipment or system for example visitors, members of the public and so on.
31. Every work activity, including operation, testing, and maintenance of electrical equipment or systems **must** be carried out in a safe manner and by a competent person in order to reduce the risk of working with or near electricity to As Low As Reasonably Practicable (ALARP).
32. Commanders, managers, and accountable persons **must** make sure that no persons in their area of responsibility are engaged in any work activity on or near live conductors (other than those suitably covered with insulating materials) unless:
- a. It is unreasonable in all circumstances for it to be dead; and
 - b. It is reasonable in all circumstances for them to be at work on or near it while it is live; and
 - c. Suitable control measures (including where necessary the provision of suitable protective equipment) are taken to prevent injury.
33. Electrical equipment **must** be suitable for the environment and conditions of use to which it may reasonably foreseeably be exposed so that risk of injury which may arise from such exposure is reduced to as low as is reasonably practicable.
34. If substances are present in the environment that accelerate corrosion of metallic enclosures or fittings, special materials or surface treatments may be necessary. In these cases, the electrical equipment **must** be protected, for example motors, and be of a type which is totally enclosed by an appropriate corrosion-resistant housing, that is, not ventilated to the atmosphere.
35. All electrical equipment or systems **must** be appropriately insulated (in line with the appropriate [HSE electricity standards](#)), and the insulation **must** be effective to enable the equipment or system to withstand the applied voltage and any likely transient over-voltages. All conductors in an electrical system **must** also be appropriately insulated and be, so far as is reasonably practicable, mechanically protected to prevent the risk of injury, or be suitably separated from contact so as to prevent risk of injury.
36. Before electrical equipment is energised, the system to which it is being connected **must** be considered so that its strength and capability cannot be exceeded and introduce a risk of injury. Electrical equipment **should** be tested for conformity / safety by a competent person, prior to energising the equipment.

Portable electronic devices (PED)

37. The decision to allow the use of portable electrical devices (PED)⁴ and other small electrical equipment (not issued by Defence) on the Defence estate under their area of responsibility rests with the accountable person. Where the use of personal PEDs has been authorised then they **must** be considered in the risk assessment along with any control measures that may be necessary.

38. Where the accountable person has not authorised the use of PEDs or any other electrical equipment on the Defence estate under their area of responsibility this **must** be effectively communicated.

39. Where the accountable person has authorised the use of PEDs or other electrical equipment on the Defence estate under their area of responsibility then local policy and procedures **should** be developed and effectively communicated which set out where their usage is allowed.

40. The most significant safety risk associated with PEDs comes from charging such devices, and therefore the following safety points **must** be considered when charging PEDs on the Defence estate:

- a. Only a UKCA (or CE) marked charger is to be used.
- b. Unplug the device when leaving it unattended for long periods of time.
- c. Regularly check charging cables for damage, for example fraying, bare wiring and other signs of wear.
- d. Regularly check during the use of the device for any signs of overheating such as scorch marks or melted plastic.
- e. Charge the device on a level ventilated surface free from obstructions, for example a desk and not on carpets, or other soft furnishings.
- f. Use wall sockets to charge from and not extension leads.
- g. If the charger is damaged stop using it immediately.

Note: If there are any safety faults found with a Defence issued PED then stop using it immediately and report this to the issuing authority in accordance with Defence organisation or local procedures.

41. The risk assessment **must** also consider the use of other non-business related electrical equipment for example kettles, toasters, coffee machines, desk fans, heaters and so on if their use has been permitted on the part of the Defence estate covered by that risk assessment.

42. There are also a number of safety risks associated with the use of e-cigarettes on the Defence estate that **must** be considered, for example they **must** not be used in restricted areas close to the storage of fuel, hazardous chemicals, or any other combustible material.

⁴ The definition of a PED covers portable electronic devices used for sending and receiving information such as mobile phones, two-way radios, i-pads and laptops that are generally battery operated and require mains charging.

43. The disposal of e-cigarettes is not permitted on the Defence estate unless there is a local policy and process in place for the safe disposal or recycling of depleted batteries and equipment.

44. Further details on the health and wellbeing of using e-cigarettes is set out in [JSP 661 Health and Wellbeing](#).

Policy Statement 4

Accountable persons **must** make sure that the safety hazards associated with the use, charging, transportation, and storage of Electric Vehicles (EVs), Powered Transporters (PTs) and other Lithium-ion power sources, are identified and managed on the Defence estate under their area of responsibility.

45. Accountable persons **must** make sure that suitable and sufficient safety risk assessments are undertaken for the Defence estate under their area of responsibility and that the hazards associated with the use, charging, transportation, and storage of Electric Vehicles (EVs) and Powered Transporters (PTs) are considered as part of those risk assessments. If the risk assessment has been undertaken on behalf of the accountable person then the person undertaking the risk assessment **must** make the accountable person aware of the risks identified in the risk assessment.

46. Accountable persons **must** make sure that the safety risks associated with the use, charging, transportation, and storage of EVs that are owned/leased by Defence or the EVs and PTs owned/hired privately but used or stored within the Defence estate under their area of responsibility are reduced to ALARP and are tolerable. If the safety risks cannot be reduced to ALARP and/or are not tolerable after applying the necessary control measures and are higher than the level of risk that the accountable person is authorised to accept then the risk **must** be elevated through the Defence organisation's elevation process in accordance with their Safety Management System (SMS). PTs **must** not be used on the Defence estate without the consent of the accountable person.

47. Most EVs and PTs are powered by Lithium-Ion (Li-ion) batteries and Li-ion power sources can present a significant risk of fire and toxic emissions. The accountable person **must** consider the risks associated with all Li-ion power sources (for example Li-ion batteries fitted to EVs, PTs, other Li-ion battery powered equipment or loose Li-ion batteries) and other types of batteries, including the potential for explosion which **must** be assessed and where necessary control measures implemented in accordance with the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR). Wherever batteries are stored or charged, risk assessments must be undertaken, including a DSEAR assessment as set out in JSP 375 Volume 1, Chapter 9 ([Dangerous Substances and Explosive Atmospheres Regulations](#)).

48. Individuals that manage, use or maintain EVs or PTs **must** comply with any relevant safety information in the equipment support publications and/or instructions provided by their Defence organisation, the acquisition team or the vehicle manufacturer. They **must** complete any relevant training courses to ensure they have the necessary level of competence and to make sure that the risks associated with their interaction with EVs or PTs are reduced to ALARP.

49. JSP 850 (Infrastructure and Estate, Policy, Standards and Guidance) **must** be followed with regards to the management and use of the Defence estate and follow the relevant equipment technical publications for using, storing, or charging EVs, PTs and any other Li-ion battery powered equipment.

Using EVs and PTs

50. The key safety issues to consider with the use of EVs and PTs are as follows:

- a. Individuals using or managing the use of EVs and PTs **must** understand their associated risks and to make sure those risks are reduced to ALARP.
- b. Operators and maintainers of EVs and PTs **must** comply with any safety information provided by the Defence organisation or the vehicle manufacturer.
- c. Operators and maintainers of EVs and PTs **must** have completed (and remain current in) any training courses deemed necessary by their Defence organisation to ensure they have the competence to safely operate or maintain EVs or PTs.

Charging EVs

51. The key safety issues to consider when charging EVs are as follows:

Note: The following safety consideration for charging would apply equally to plug-in hybrid vehicles that use the same charging facilities.

- a. Where EV charging takes place on the Defence estate, formal arrangements **must** be put in place and instructions for the safe use of the equipment made available.
- b. EVs **must** only be charged via authorised and marked dedicated EV charging points and in accordance with the standing orders on site, this is referred to as Mode 3 or Mode 4 charging and is the recommended solution for EV charging on the Defence estate. Where Mode 3 or Mode 4 charging is not available then only EV supply cables equipped with In-Cable Control and Protective Device (ICCPD) are to be used in conjunction with a BS1363-2 socket outlet marked EV on its rear and a label provided stating suitable for electric vehicle charging, this is referred to as Mode 2 charging. EVs **must** not be charged using cables without an ICCPD. EVs **must** not be charged using BS1363 socket outlets not marked for EV. Please refer to JSP 850 for further guidance on EV charging, charging modes, labelling and technologies applicable across the Defence estate. Disciplinary action may be taken against anyone misusing BS1363 sockets for EV charging, in SLA, SFA, technical buildings, garages, workshops and so on.
- c. EV charging **must** be sufficiently remote from any existing hazard zones and locations used for the storage of hazardous or flammable liquids and gases in accordance with DSEAR. Existing DSEAR assessments **must** be checked to make sure that EV charging activity does not take place inside a hazard zone.

- d. Charging EVs is to be done in a dedicated area that is above ground level, and consideration **must** be given to the distance/separation from buildings to reduce fire spread in the case of a fire. More stringent distances may need to be considered in hazardous areas, for example where there is Ordnance, Munitions and Explosives (OME) or other flammable fuel sources, where there is critical Defence infrastructure or systems such as aircraft or where stated in site-specific requirements.
- e. EVs **should** not be charged inside buildings including hangars, garages, and workshops or in underground parking facilities. Where there is no alternative to this then EV Charging Points and charging areas **must** have safety risk control measures in place for example; fire resistance separation / compartmentation measures and structural integrity, fire detection and alerting systems and appropriate fire suppression systems installed.
- f. Consideration **must** be given to locating EV charging points and charging EVs in a shaded area in some overseas locations where hotter climates are more common.
- g. All authorised EV charging facilities and areas **must** be well sign posted in accordance with JSP 375 Volume 1, Chapter 6 ([Safety Signs](#)) and well ventilated. The toxic products released by Li-Ion in the event of a fire increases the risk to life for those in the vicinity. For EV charging facilities where natural ventilation is limited enhanced mechanical ventilation **must** be considered to mitigate against this risk.
- h. EV charging points are regarded as work equipment and the roles and responsibilities regarding the safe use of work equipment **must** be followed as set out in JSP 375 Volume 1, Chapter 22 ([Work Equipment](#)) and this chapter.

Charging PTs

52. The key safety issues to consider when charging PTs are as follows:

- a. PTs **must** not be stored or charged close to any existing hazard zones and locations used for the storage of hazardous or flammable liquids and gases in accordance with DSEAR. Existing DSEAR assessments **must** be checked to make sure that PT charging activity does not take place inside a hazard zone. This is true of all types of battery charging on the Defence estate, for example Li-ion and lead acid batteries.
- b. PTs **must** not be stored or charged in sleeping accommodation, emergency escape routes or anywhere on the Defence estate, where in the event of a fire it could adversely affect the means of escape.

Note: There may be other locally agreed arrangements in place based upon occupational health or accessibility grounds, for example for electric wheelchairs and mobility aids.

Transporting EVs and Li-ion batteries

53. The key safety issues to consider when transporting EVs and Li-ion batteries are as follows:

- a. EVs with Li-ion batteries installed are classified as dangerous goods (DG) in their own right as UN 3171⁵ and Hybrid Electric Vehicles (HEVs) are UN 3166⁶. Li-ion batteries that are not installed into vehicles or equipment are also classified as DG in Class 9 miscellaneous dangerous goods and articles as UN 3090⁷.
- b. EVs and loose Li-ion batteries **must** be transported in accordance with the [Dangerous Goods Manual \(DGM\)](#), which directs the use of the mode specific regulations. The requirements for the safe transport of damaged and faulty EVs, is contained in the Special Provisions and Packing Instructions for the relevant modal regulations, as there are differences between the different transport modes.
- c. EVs that are used for the transportation of DG **must** only do so in accordance with the DGM. European Union (EU) transport legislation 'Accord Dangerous Routier' (ADR) prohibits the approval of EVs or HEVs as EX (explosive carrying) or FL (flammable liquid carrying) vehicles.
- d. Any Li-ion battery that is contained in a vehicle or equipment, or is loose, that is to be transported **must** be of a type that is proved to meet the requirements of each test of the UN Manual of Tests and Criteria, Part III, sub-section 38.3.
- e. Li-ion batteries that are in storage, **should** be kept in their original transport packaging, to enable onward transportation to the end user. If it is not possible to use the original packaging, then Li-ion batteries **must** be repackaged for transportation in similar approved packaging for example packaging approved by the International Air Transport Association (IATA) or that meets other DGM requirements. Further information on the storage of Li-ion batteries is provided in Part 2 of this chapter.

EV and Li-ion battery fires

54. In the event of any EV, PT or Li-ion battery fire you **must** follow these key safety points:

- a. **Do not** attempt to extinguish the fire.
- b. **Avoid** inhaling the toxic smoke vapours.
- c. **Leave** the building by the nearest exit.
- d. **Raise the alarm** and call the fire and rescue service immediately (explain that it is a lithium fire).

⁵ UN 3171 is the United Nation (UN) classification for vehicles or equipment powered by lithium-ion batteries or lithium metal batteries, where the lithium battery is installed in the vehicle or equipment.

⁶ UN 3166 is the United Nations (UN) classification for vehicles powered by an internal combustion engine, or flammable gas powered, or flammable liquid powered. UN 3166 includes Hybrid Electric Vehicles (HEV's).

⁷ UN 3090 is the United Nation (UN) classification for lithium metal batteries including lithium alloy metal batteries that are not installed in the vehicle or equipment.

55. When driving HEVs or EVs that produce what appears to be smoke, and there is no visible flame in the passenger compartment, assume this is a battery failure. The driver and passengers **must** evacuate the vehicle immediately, get well clear of that vehicle, contact the emergency services, and do not attempt to fight the presumed fire. The smoke may be a lithium vapor cloud that is both toxic and explosive.

56. JSP 426 ([Defence Fire Safety & Fire Risk Management Policy, Guidance, and Information](#)) **must** be followed in order to keep the risk from fire of assets and property to ALARP. In premises to which the Regulatory Reform (Fire Safety) Order 2005 (or equivalent legislation in Scotland and Northern Ireland) applies, the fire safety management strategy **should** consider practical passive, active, and managerial control measures as part of the fire risk assessment for the premises when selecting and designing areas for the use, charging and storage of EVs, PTs or other Li-ion battery powered equipment.

Disposal of batteries and electrical equipment

57. The disposal or recycling of all types of depleted batteries and obsolete electrical equipment on the Defence estate **must** be done in accordance with local (site level) policy and processes.

58. Due to the significant risk of fire and toxic emissions, extra consideration **must** be given to the disposal of Lithium batteries, for example the packaging, safety, and environmental guidelines that **must** be followed. All Defence establishments **must** have local policies and guidelines in place for the disposal of batteries which, includes Lithium batteries, and **should** be in accordance with the wider Defence battery disposal contract.

Policy Statement 5

Commanders, managers, and accountable persons **must** make sure that procedures are in place for the provision of suitable and sufficient information, training, and where appropriate supervision, for working with electrical equipment and systems for the personnel under their area of responsibility.

59. Commanders, managers, and accountable persons **must** make sure that all personnel under their area of responsibility have suitable and sufficient information, training (induction and refresher) and where appropriate supervision, when working with electrical equipment and systems.

60. Commanders, managers, and accountable persons **must** make sure that only authorised and competent persons (or, if in training, under the supervision of a competent person) are allowed to maintain, or test electrical equipment or systems. The type of training **must** include, as a minimum, but not limited to:

- a. general safety induction training;
- b. training on particular pieces of electrical equipment, for example installation, maintenance, operation and operating conditions;
- c. training on working in high-risk areas; and
- d. regular refresher training to maintain currency.

61. Commanders, managers and accountable persons **must** make sure that any person engaged in any work activity on electrical equipment or systems within their area of responsibility has the required level of competence and that person can evidence this.

Policy Statement 6

All personnel **must** comply with policy, information, instruction, and training provided by commanders, managers, accountable persons, local procedures and with manufacturers safety instructions for the safe use of electrical equipment and systems.

62. Personnel **must** always use and carry out user checks on electrical equipment in accordance with the user information provided for that equipment and comply with any safety instructions provided by their Defence organisation or the equipment manufacturer.

63. Personnel **must** not modify, or use modified electrical equipment provided for use at work unless the modification has been authorised and carried out and tested by a competent person. In some cases, it may be difficult for general users to identify modified electrical equipment and therefore if a user suspects that any electrical equipment has been modified or tampered with, they **should** consult a competent person before using it.

64. Under no circumstances **must** personnel change, modify or bypass safety related devices (for example, fuses, circuit breakers or Residual Current Devices (RCDs)) as these are there to reduce the risk of harm to the user and / or protect the electrical system from overloading.

65. Sockets **must** not be overloaded; extension leads of an appropriate length and power rating may be used but only on a temporary basis. Where multi plug extension leads are used they **must** not be overloaded and multiple (two or more) extension leads **must** not be plugged into each other, this is sometimes referred to as a daisy chain. Extension leads **must** be correctly fused for the power requirements for which they are being used.

66. Electrical equipment that is used outdoors **must** always be plugged into a socket that is protected by a Residual Current Device (RCD) as set out in [BS7671](#). If it is unclear if a socket is RCD protected then it **must** be assumed that it isn't. Further information on the use of RCDs is set out in health and safety guidance (HSG) [HSG85](#) and maintenance in [HSG107](#).

67. All electrical related safety occurrences (including near misses and unsafe conditions) **must** be reported and investigated in line with Defence organisation safety occurrence reporting procedures and in line with JSP 375 Volume 1, Chapter 16 ([Safety occurrence reporting and investigation](#)).

Part 2: Guidance

This part provides the guidance and good practice that **should** be followed to help you comply with this policy.

Electrical safety guidance

Policy Statement 1

The accountable person **must** make sure that suitable procedures are in place to inspect, test, and maintain all electrical equipment and systems being used on the facilities or by personnel under their area of responsibility and to make sure that records of this are maintained.

1. Where the accountable person has put procedures in place for inspecting, testing, and maintaining electrical equipment and systems, on the Defence estate under their area of responsibility, the procedures **should** include the isolation or removal and reporting of defective electrical equipment and systems.
2. The planned maintenance, inspection and test regime **should** be risk based (guidance on minimum frequencies and requirements is at Annex A to this chapter).
3. The main purpose of electrical testing and inspection is to identify and address potential hazards, ensuring the safety and reliability of the equipment or system. Periodic inspections by competent persons help prevent accidents, ensure compliance, and extend the lifespan of electrical equipment and systems.
4. Electrical testing and inspection **should** involve a thorough evaluation of all electrical equipment and systems to ensure compliance with current safety standards. This process **should** include (but not limited to) visual inspections, functional testing, safety assessments, insulation resistance testing, continuity testing, and checks on devices like RCDs. Further guidance on testing and inspecting electrical equipment and systems is set out at Annex A of this chapter.
5. Any defective items **should** be removed from service and / or secured and identified as 'Unsafe – Do Not Use' by using the appropriate electrical safety signage. Inspection and testing can be performed simultaneously and **must** be carried out:
 - a. where there is a reason to suspect equipment may be faulty, damaged, or contaminated, but this cannot be confirmed by visual inspection; and
 - b. after any repair, modification, or similar work to the equipment, when its integrity needs to be established.
6. The decision to allow personal electrical equipment to be used on the Defence estate rests with the relevant accountable person.
7. A local policy and procedure **should** be developed and promulgated to all Defence personnel which defines where the use of personal electrical equipment is allowed, and the control measures (i.e., test and inspection) to be adhered to.

8. Local policy and procedures **should** define what is and what is not covered in the scope of personal electrical equipment and any restrictions on their use.
9. Chargers for PEDs that plug into the mains **should** be included as personal electrical equipment and subject to inspection (further guidance can be found in Annex A to this chapter).
10. Local procedures **should**, where appropriate, include the use of adaptors for electrical equipment with different plugs or voltages to the host nation domestic electrical system.

Policy Statement 2

The accountable person **must** make sure that responsibility for electrical equipment and systems, including the point of demarcation, are clearly defined, and documented where infrastructure or equipment is managed, owned and / or maintained by a third party.

11. Where electrical equipment or systems, are managed, owned and / or maintained by a third-party organisation (for example Maintenance Management Organisation, project team, external contractor and so on) the accountable person **must** make sure that the responsibilities are well documented and communicated and follow the co-ordination, co-operation, communication, and control (4Cs) direction set out in JSP 375 Volume 1, Chapter 34 ([4C System - Management of Visiting Workers / Contractors](#)).
12. Further information on the roles and responsibilities associated with working on electrical equipment or systems such as specific written instruction, certificates and permits to work are set out in JSP 375, Volume 3, Chapter 3 ([Electricity](#)).
13. It is the responsibility of the service, infrastructure, or equipment provider to carry out the relevant testing, inspection and maintenance of all electrical equipment and systems for which they have ownership and / or maintenance responsibilities for. It is also the responsibility of the service, infrastructure, or equipment provider to retain records as evidence and to provide these records to the accountable person or other official interested parties upon request.

Policy Statement 3

Commanders, managers, and accountable persons **must** make sure that safety risk assessments consider potential electrical hazards for all personnel working on, near or using electrical equipment or systems under their area of responsibility.

14. Commanders, managers and accountable persons **should** make sure that all personnel under their area of responsibility consider the potential electrical hazards that may arise when working on or using electrical equipment / systems due to damage, age, history, usage, the environment in which it is installed / used, and that suitable and sufficient control measures (Safe Systems of Work, permits to work, etc.) are in place.
15. Other control measures may include but not limited to:
 - a. regular EET (Electrical Equipment Testing) of electrical equipment;

- b. additional training for personnel on the safe use of electrical equipment;
- c. preventing access to certain distribution boxes (locks); or
- d. putting up warning signs.

16. The frequency and regime to which electrical equipment / systems are inspected, tested and maintained **should** be established (based on a combination of risk and where appropriate the table at Annex A to this chapter, and in line with local procedures) and all relevant electrical equipment / systems made readily available for inspection or testing in accordance with this regime or local procedure.

17. Any inspection or test only identifies that a piece of electrical equipment is safe to use at the time of that inspection or test.

18. To ensure ongoing electrical safety, managers **should** make sure that personnel using electrical equipment are advised to routinely check that there is no visible damage to the equipment or leads before use.

Policy Statement 4

Accountable persons **must** make sure that the safety hazards associated with the use, charging, transportation, and storage of Electric Vehicles (EVs), Powered Transporters (PTs) and other Lithium-ion power sources, are identified and managed on the Defence estate under their area of responsibility.

19. Commanders, managers, and accountable persons **must** follow the direction set out in Part 1 of this chapter for the use, storage, transportation or charging of EVs on the Defence estate under their area of responsibility.

20. Most EVs are powered by Li-ion batteries and Li-ion power sources can present a significant fire and toxic emissions hazard. The safety risks associated with EVs may differ from other electrical systems or equipment, some examples are:

- a. Li-ion batteries are vulnerable to overheating (particularly during charging) which can result in an explosive ejection of material, often referred to as a 'thermal runaway', which can spread fire much faster and further than conventional electrical fires. Where specially designed charging facilities are not available this presents a specific risk.
- b. Li-ion battery fires are not easily extinguished by conventional means. As such, fires present a significant threat if suppression systems are not designed with this in mind, this issue is particularly prevalent in areas such as underground parking.
- c. The use of portable fire extinguishers for Li-ion battery fires **should** only be done by individuals who have had specialist training and are provided with appropriate PPE, therefore untrained individuals **should** not attempt to tackle a Li-ion battery fire with a portable fire extinguisher.
- d. The risks associated with the use and charging of EVs significantly increases if they are mis-used, poorly maintained, the batteries are physically damaged, the batteries and/or the charger are non-standard for the equipment, they are over-charged or charged at the wrong rate.

21. The following EV legislation and Regulations **should** be read in conjunction with this chapter:

- a. [ECE Regulation 100 \(Revision 3\) - Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train.](#)

Note: ECE Regulation 100 does not cover HGV at this time, it is currently unknown if there are any specific regulations or legislative requirements within the civilian sector.

- b. [Automated and Electric Vehicles Act 2018 \(legislation.gov.uk\).](#)
- c. [The Electric Vehicles \(Smart Charge Points\) Regulations 2021 \(legislation.gov.uk\).](#)

22. The following Defence publications **should** be read in conjunction with this chapter:

- a. JSP 850 [\(Ultra-Low Emission Vehicles \(ULEV\) Infrastructure for MOD White Fleet\).](#)
- b. JSP 850 [\(MOD Electric Vehicle Charging Infrastructure \(EVCi\) Non-White Fleet and Private Use\).](#)
- c. DIO Technical Bulletin [\(Fire safety for EV charging points and infrastructure\).](#)
- d. DIO Technical Standards [\(Electrical requirements for periodic inspection and testing of explosives facilities\)](#) and [\(Inspection and testing of LV electrical installations and equipment\).](#)

[DLSR/RI/24-008 - Tooling and Training Requirements for units with electric vehicles.](#)

- e. All relevant equipment support publications and/or instructions provided by the Defence organisation, the acquisition team or the vehicle manufacturer for important safety information on the use, charging, transportation, and storage of EVs and/or Li-ion batteries and their recommended inspection, testing and maintenance schedules.

Storage of Li-ion batteries

23. Li-ion batteries **should** be stored in well ventilated, dry, and cool locations i.e., avoiding excessive humidity and heat, including direct sunlight. Manufacturers recommended temperature ranges are to be followed and where necessary, storage areas **should** be provided with suitable mechanical cooling/ heating systems and with appropriate signage.

24. Li-ion batteries **should** be stored in a reduced state of charge. This **should** be in accordance with manufacturers recommendations but is typically around 30% of the total capacity. Incoming Li-ion batteries are to be inspected for state of charge and signs of damage. Any batteries showing signs of damage including trauma, odours, high temperatures, leaks, smoking or vibration are to be immediately segregated and in accordance with manufacturer or local policy, returned or disposed.

25. To ensure safety is maintained throughout storage, inspections **should** be periodically repeated. Additionally, to avoid damage, battery handling areas are to be kept free of sharp objects that can puncture the cells and Li-ion batteries are always to be handled with care.

26. When not in use, it is preferable that Li-ion batteries are stored externally and as far away from buildings, valuable assets, and combustibles as possible. For damaged batteries, this distance **should** be at least 10 metres. Subject to risk assessment, this distance may be reduced for healthy batteries.
27. Where external storage is not possible, Li-ion batteries are to be stored separately from other stock and where possible, be placed in a dedicated fire resisting storeroom or bespoke enclosures, such as cabinets or fireproof bags. Storage areas **should** be limited in size and batteries **should** not be stored within racks or stacked pallets unless these are sprinklered and divided by suitable fire resisting construction.
28. In the event of a fire and Li-ion batteries enter thermal runaway, they release huge quantities of toxic and flammable gases, producing between 500 and 6000 litres of gas per kWh. To mitigate against the risk of explosion, suitable ventilation is required in the storage area and a suitable smoke detection system which provides adequate warning to other occupants of the building (ideally combining smoke and carbon monoxide detection) **should** be provided.
29. Consideration **should** be given to the provision of sprinklers. Li-ion battery fires can span several fire classes (A, B, C). Whilst there is a large range of extinguishing agents available, including specialist agents such as Aqueous Vermiculite Dispersion (AVD), they may not always be relied upon to stop thermal runaway from Li-ion fires and therefore expert advice should be sought on extinguishing agents as part of the Fire Risk Assessment (FRA). If the fire is extinguished and thermal runaway continues, the hazard will switch from fire to explosion. First aid firefighting (use of extinguishers) **should** only take place by individuals who have had specialist training and are provided with appropriate PPE, therefore untrained individuals **should** not attempt to tackle a Li-ion battery fire with an extinguisher.
30. The Regulatory Reform (Fire Safety) Order requires that the FRA is to consider 'all significant risks of fire within the premises' for it to be classed as 'suitable and sufficient'. If present, this includes life safety considerations in relation to Li-ion batteries. In addition to life safety, Defence Fire Safety Regulations, [DFSR Regulations-DSA 02](#), Regulation 101, requires that Front Line Commands and Enabling Organisations consider the risk of fire and provide effective, economic and risk proportionate fire protection measures to protect Defence capability. In addition to the considerations above, recommendations made within FRAs, Fire Resilience Risk Assessments, and Business Impact Analysis, are to be acted upon.
31. The required period of fire resistance will vary depending on the size and quantities of batteries. In some cases, as much as 120-minute fire resistance maybe required.

Policy Statement 5

Commanders, managers, and accountable persons **must** make sure that procedures are in place for the provision of suitable and sufficient information, training, and where appropriate supervision, for working with electrical equipment and systems for the personnel under their area of responsibility.

32. Only authorised competent persons are allowed to work on electrical equipment and systems and as such they are to:
- a. work in accordance with the appropriate Safety Rules and to take all reasonably practicable safety measures necessary to prevent danger or injury to persons and to prevent damage to infrastructure or equipment.
 - b. be aware of the extent and limits of the work to be undertaken and of any constraints on the sequence or method of working.
 - c. take reasonable care for their own and other persons' health and safety.
 - d. only work in locations or on equipment that is listed on their Certificate of Appointment.
33. It is the responsibility of commanders, managers, and accountable persons to make sure that procedures are in place for the provision of suitable and sufficient information, training, and where appropriate supervision, for working with electrical equipment and systems for the personnel under their area of responsibility.
34. Low Voltage and High Voltage training is explained more in JSP 375, Volume 3, Chapter 3 ([Electricity](#)).

Policy Statement 6

All personnel **must** comply with policy, information, instruction, and training provided by commanders, managers, accountable persons, local procedures and with manufacturers safety instructions for the safe use of electrical equipment and systems.

35. Personnel **should** perform routine user visual checks (as set out in Annex A of this chapter) ensuring that any suspected electrical faults are reported to their manager, the equipment taken out of service until it has been examined by a competent person and passed inspection / testing, as appropriate.
36. Electrical equipment **should** be plugged into the nearest suitable socket to avoid overstressing the equipment's cable and in the event of an emergency for it to be easily disconnected from the power supply.
37. Extension leads **should** be subject to the same inspection regime as applied to other electrical equipment; unless they form an integral part of a static cable management system (e.g., built into a fixed desk) that is subject to a defined inspection schedule.
38. Where personal electrical equipment is permitted to be used on the Defence estate (for example in clubs), ship, vessel, or workplace all personnel **should** comply with local policy relating to its use, testing and inspection.

39. Personnel **must** not modify, or use modified electrical equipment provided for use at work unless the modification has been authorised and carried out and tested by a competent person.

Retention of records

40. All records **must** be retained in accordance with JSP 375, Volume 1, Chapter 39 (Retention of Records).

Related documents

41. The following documents **should** be consulted in conjunction with this chapter:

- a. JSP 375, Volume 1:
 - (1) Chapter 2 - Military and Civilian Workplace Safety
 - (2) Chapter 6 - Safety Signs
 - (3) Chapter 8 - Safety Risk Assessment and Safe Systems of Work
 - (4) Chapter 16 - Safety Occurrence Reporting and Investigation
 - (5) Chapter 22 - Work Equipment
 - (6) Chapter 30 - Permit to Work
 - (7) Chapter 34 - 4Cs System (The management of visiting workers and contractors)
 - (8) Chapter 39 - Retention of Records
- b. JSP 375, Volume 3;
 - (1) Chapter 3 - Electricity Safety Rule Book (SRB) for Persons in Charge of Work on Electrical Systems.
- c. Other Defence Publications
 - (1) JSP 604 - Defence Manual for Information and Communication Technology (ICT)
 - (2) JSP 850 - Infrastructure and Estate, Policy, Standards and Guidance
 - (3) JSP 426 - Defence Fire Safety & Fire Risk Management Policy, Guidance, and Information
 - (4) BR 2000(52)(1) - Ships High Voltage
 - (5) [DIO Technical Bulletin \(Fire safety for EV charging points and infrastructure\)](#)
 - (6) [DIO Technical Standard \(Electrical requirements for periodic inspection and testing of explosives facilities\)](#)
 - (7) [DIO Technical Standard \(Inspection and testing of LV electrical installations and equipment\)](#)
 - (8) Defence Fire Safety Regulations, [DFSR Regulations-DSA 02](#)

- d. British Standards - these can be accessed via the StanMIS site⁸;
 - (1) [BS 7671](#)- IET Wiring Regulations
- e. Legislation and Guidance;
 - (1) [Health and Safety at Work, etc. Act 1974](#)
 - (2) [Management of Health and Safety at Work Regulations 1999](#)
 - (3) [Electricity at Work Regulations 1989](#)
 - (4) [The Electrical Safety Standards in the Private Rented Sector \(England\) Regulation 2020](#)
 - (5) [Merchant Shipping \(Guarding of Machinery and Safety of Electrical;](#)
 - (6) [HSE L22 – Safe use of work equipment](#)
 - (7) [HSG85 - Electricity at work – Safe working practices](#)
 - (8) [HSG107 - Maintaining portable electrical equipment](#)
 - (9) [INDG139 - Using electric storage batteries safely](#)
 - (10) [INDG231 - Electrical safety and you](#)
 - (11) [INDG236 - Maintaining portable electric equipment in low-risk environments](#)
 - (12) [Carriage of Dangerous Goods Manual- HSE](#)
 - (13) [HSE - Electric and hybrid vehicles](#)

⁸ Access to British Standards is free via the StanMIS site, to access the service email: DESTECH-EGDStan-BSOL@mod.gov.uk. In accordance with the instructions on the [DE&S information page](#) you will receive an automated response containing instructions and registration keys.

Inspection and Testing Guidance for Electrical Equipment

Minimum Advised User Visual Checks

1. User checks **should** include but not be limited to checking for:
 - a. damaged, poorly maintained or poorly installed plugs or cables
 - b. correct connectors used to join cables (no twisted wires or taped joints)
 - c. incorrect use of extension leads (e.g., two or more connected together)
 - d. signs of scorching or burn marks
 - e. loose wires or missing or damaged insulation
 - f. damaged equipment casing
 - g. correct marking (e.g., in-date test labels)

Formal Visual Inspections

2. Visual checks do not have to be undertaken by a qualified electrician. Visual inspections can be carried out by a member of staff with the relevant competence. A visual inspection **must** be conducted with the equipment isolated, and is undertaken to make sure that:
 - a. there is no damage, cuts, and abrasions (apart from light scuffing) to any cable covering
 - b. there is no damage to any plug e.g., the casing is not cracked or none of the pins are bent or misaligned
 - c. the outer covering (sheath) of the cable is securely gripped where it enters the plug or the equipment, and that the coloured insulation of the internal wires are not visible without removing the plug or equipment cover
 - d. the equipment shows no sign of having been used in an environment where it is not suitable (e.g., wet or muddy)
 - e. there is no damage to the outer cover of the equipment, e.g., obvious loose parts, screws missing or cracks in the casing
 - f. there are no signs of overheating (burn marks or staining).
3. Checks may also include checking that:
 - a. the cable terminations are secure and the correct polarity
 - b. the correct rated fuse is fitted

Minimum Advisory Testing

4. Formal testing of electrical equipment **must** only be performed by a competent person. A person not skilled in electrical work but trained in the use of and routinely using a simple 'pass / fail' type of electrical equipment tester (EET) and the knowledge to calculate the correct fuse rating may be adequately competent for testing equipment. When undertaking such tests the appropriate test procedures **must** be rigorously followed and the acceptance criteria **must** be clearly defined. The testing of any equipment / system that is hard-wired to an electrical supply above ELV **must** be carried out by a competent qualified electrician and in accordance with JSP 375, Volume 3, or as instructed by the appropriate Safety Case and specific regulations.

Recommended Inspection / Testing Intervals for Electrical Equipment

Equipment/environment	Daily User visual checks	Formal visual inspection	Combined inspection and test
Power leads, Extension leads, plugs, and cables.	Yes	As per category used with below	As per category used with below
Heavy industrial use, high risk of equipment damage, e.g., circular saws, and angle grinders.	Yes	Yes, Weekly	Yes, 6-12 months
Residual Current Devices (RCDs).	Yes Functional Test (socket outlet & portable RCDs)	Yes, Weekly	Yes, If fixed on site, before first use, then 3 monthly (portable RCDs-monthly)
Light industrial use, e.g., bench mounted diagnostic and test equipment.	Yes	Yes, 6 months	Yes, 6-12 months
Earthed equipment (incl Class 1) e.g., electric kettles, some floor cleaners.	Yes	Yes, 6 months-1 year	Yes, 1-2 years
Hard wired equipment: cooker, engineering workshop machines (e.g., lathe or power-press).	Yes	Yes, 1 year	Yes, 1-5 years.
Information technology (incl Class 2FE) e.g., desktop computers, VDU screens.	No (Yes if used in a harsh operating environment)	Yes, 2-4 years or after reconfiguration	Yes, 1-5 years if not double insulated
Fixed systems and earthed equipment only moved occasionally, NOT hand-held, e.g., photocopiers and fridges.	No	Yes, 1-4 years	Yes, 1-5 years
Double insulated equipment frequently moved or hand-held e.g., phone / laptop chargers, irons, hair dryers.	Yes	Yes, 6 months-1 year	No

Equipment/environment	Daily User visual checks	Formal visual inspection	Combined inspection and test
Double insulated, moved occasionally, NOT hand-held, e.g., fans, table lamps, slide projectors.	No	Yes, 2-4 years	No
Battery operated (less than 40 volts).	No	No	No
Extra low voltage: (less than 50 volts AC) e.g., telephone equipment, low voltage desk lights.	No	No	No

5. Risk assessments and / or formal reliability studies **must** be used to identify changes to the above requirement and frequency of inspection and testing. This will depend upon the equipment type, its usage, and the operating environment (some ELV specialist equipment will require daily user checks and frequent formal inspections, for example, Ex-rated torches). Where the inspection / testing regime is picking up a number of faults then consideration **must** be given to increasing the frequency of inspection and testing.

Testing electrical equipment

6. All electrical equipment and systems **must** be tested in accordance with the manufacturer or industry guidance, and this **must** only be performed by a competent person. The competent person will decide how to undertake the testing necessary for the specific electrical equipment that requires testing and this may vary, however a typical (non-exhaustive) electrical test **should** include:

- a. a protective conductor continuity test;
- b. an insulation resistance test;
- c. if required, a protective conductor continuity test; and
- d. a functional check of the equipment.

7. It is important to recognise that it may not be possible to perform certain tests on all electrical equipment some (non-exhaustive) examples are:

- a. electrical equipment **should** not be subjected to test voltages and currents that would result in damage;
- b. some electrical testing devices may not be appropriate and may cause damage to the electrical equipment and may also lead to a degradation in the safety of that electrical equipment; and
- c. some electrical equipment **must** not be subjected to tests such as dielectric strength testing (also known as 'flash testing' or 'hi-pot testing').

8. It is the competent persons responsibility to make sure that all electrical testing is carried out in a safe system of work and the appropriate testing devices are used.

Records

9. Formal inspection and testing records **should** as a minimum include:
 - a. the description of the piece of equipment;
 - b. an asset number or equipment serial number (unique identifier);
 - c. location of the equipment;
 - d. name of person and details of person carrying out the test;
 - e. date of next inspection / test;
 - f. inspection / test Pass or Fail; and
 - g. details of any inspection / test failures.