



GREAT WESTERN SOCIETY

Policy and Plans for Utilisation, Maintenance and Testing of Fixed and Portable Electrical Equipment at Didcot Railway Centre

	Author:	Approved & Authorised for Issue:
Title:	Site Electrical Engineer	Health and Safety Director
Name:	John Sparey	John O'Hagan
Signature:		
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Ver 1.4 June 2021

John Sparey *Eng Tech MIET*
Site Electrical Engineer

**GREAT WESTERN SOCIETY
ELECTRICAL POLICY DOCUMENT**

DIDCOT RAILWAY CENTRE

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FOREWORD

1. Although electricity causes relatively few occupational accidents, those that do occur are responsible for a high proportion of deaths. Electrical faults are also the second most frequent cause of fires in industry and commerce in the United Kingdom. The majority of electrical accidents involve equipment that has become defective due to insulation failure, inadequate earthing, incorrect over-current protection (fuses, breakers, etc.) or faulty wiring. These pose a threat to personal safety causing electric shock, burns, explosions and fires.
2. The Electricity at Work Regulations 1989, came into force in all places of work on 1 April 1990. They provide general rules on insulation, cutting off supply, and maintenance of electrical systems, but they do not specify insulation materials nor the design of switches and isolators. Nor do they (contrary to what seems to be a widely held misconception) specify the nature and frequency of maintenance and testing other than to require that maintenance must be such as to prevent danger.
3. The purpose of this Policy Document is to advise all who use or work with electricity on practical ways and means of avoiding electrical danger and of complying with the Regulations. The Code is subsidiary to, and forms part of, the Society's Safety Management System.
4. The many and varied uses to which electricity is put in the Railway Centre as elsewhere are such that no single document can cover all aspects. Lists of further publications covering specific electrical safety topics are appended.
5. Certain parts of the Electricity at Work Regulations have been widely misinterpreted to imply that all existing electrical systems, plant and equipment, are rendered obsolete and must be replaced, regardless of cost, as soon as possible. This is most definitely not the case. The following is abstracted from the Health and Safety Executive's Memorandum of Guidance on the Electricity at Work Regulations 1989 (ISBN 0 7176 1602 9):

"Where electrical equipment pre-dates the Regulations this does not of itself mean that the continued use of the equipment would be in contravention of the Regulations. For example, much of the equipment to which the Regulations apply may have been made to a standard, such as a British Standard, which has since been modified or superseded. It is likely to be reasonably practicable to replace it with equipment made to a more recent standard when, but only when, it becomes unsafe or falls due for replacement for other than safety reasons, whichever occurs sooner. Equally, fixed installations to which the IEE Wiring Regulations are relevant may have been installed in accordance with an earlier edition, now superseded but then current; that in itself, does not mean that the installation does not comply with the current Regulations."

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1 INTRODUCTION

1.1 Electricity is widely used throughout the Railway Centre, and in normal circumstances no hazards should arise. Neglect and misuse of electricity can, however, result in electric shock to individuals, or in overheating, leading to fire.

1.2 This Policy Document details how the Society should assess and implement these arrangements. It forms part of the general Society policy on safety and its status is that of good practice that must either be followed or be replaced by equivalent good practice. The Policy, or relevant sections (whichever is appropriate) is incorporated into the Society's Safety Management System.

The nature of electricity is such that no Policy or Code of Practice can hope to cover every conceivable aspect of its use. Guidance on specific aspects of electrical safety can be found in relevant British Standards, official publications by the Health and Safety Executive, professional bodies such as the Institute of Engineering and Technology and many other sources.

It is of critical importance, however, that those engaged in work with electricity to any degree should have the necessary level of competence to carry out their work safely. It is also important to bear in mind that ensuring the competence of those working with electricity is a statutory requirement, failure to observe which is a serious offence, carrying with it heavy penalties. The following is extracted from the Health & Safety Executive's official guidance on the Electricity at Work Regulations.

Only those who have both the knowledge and experience to make the right judgements and decisions and the necessary skill and ability to carry them into effect should undertake work subject to this Code. A little knowledge is often sufficient to make electrical equipment function but a much higher level of knowledge and experience is usually needed to ensure safety.

Special note:

The term 'Facility Manager' is used throughout the code. The Facility Manager is responsible to the Operations Manager for ensuring that the Facility, any activity in the Facility and any equipment used in the Facility complies with all safety requirements.

1.3 This Code is intended for Facilities with no staff approved for the construction, repair and maintenance of equipment and fixed installation and who use only commercially produced equipment.

1.4 The electrification structures and cabling of the Network Rail System pose an obvious danger, and are not covered in this document, but it must be pointed out that no one should go near a structure or have an item long enough to touch the wires and additionally that no one should be outside of our fence line unless they have a NR PTS which already has 25kV electrification as part of its training.

All other issues around safety of 25kV are dealt with within the DRC Operating and General Regulations Manual.

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2 GENERAL SPECIFICATIONS

2.1 Didcot Railway Centre is a harsh environment for electrical equipment.

The conditions experienced during restoration or maintenance of locomotives and rolling stock are not far removed from those of a construction site. Accordingly, the Society policy is to eliminate, as far as is practicable, the use of 230/240V equipment outside of the office, catering, shop and museum areas. New installations will incorporate RCD protection on all 230/240V and 400/415v socket outlet circuits.

2.2 Hand tools should operate at 110V from a centre tapped earth supply, giving a maximum of 65V to earth. The standard connector to be a BS4343 16A 2P & E plug or socket with earth position 4h.

2.3 Handlamps used in boilers, tanks or other metallic vessels should be supplied from a 25V centre tapped earth supply.

Alternatively, battery operated hand tools or lamps may be used, with the recharging of the battery taking place in a ventilated indoor area (eg Mess Room, Catering Building).

2.4 The use of Step-up transformers to obtain 240V from a 110V input is deprecated and should only be used under controlled conditions and fitted with primary and secondary overload protection and the output connector must be further protected by a 30mA Residual Current Device. Departments making use of such devices shall eliminate their use when equipment is replaced by purchasing equipment designed to operate on 110V supply.

2.5 Welding machines and other similar equipment may require the use of more power than can be supplied by the 110V distribution system, and equipment requiring more than 2kW should be ordered for operation on 400/415V supply. The purchaser must liaise with the Electrical Department for provision of a suitable RCD protected supply, which will terminate on a suitably rated BS4343 3P N & E socket with earth position 6h. The cabling to the machine, or any extension lead, is to be of the type incorporating an earthed steel braid in addition to the circuit live and protective conductors (Olflex 'SY' cable or similar)

2.6 230/240V supplies will be afforded to accommodation vehicles, as these move relatively infrequently, but the supply will be afforded via a suitably rated RCD protected socket. Supply leads to these vehicles are to be of a type incorporating an earthed steel braid in addition to the circuit live and protective conductors (Olflex 'SY' cable or similar), and the connection to the vehicle must be made via a suitably rated connector (on the cable) and a fixed plug (on the vehicle), to allow for safe and easy disconnection by the Shunters.

2.8 RESIDUAL CURRENT DEVICES (RCDs) FOR EARTH LEAKAGE PROTECTION

2.8.1 Residual current devices (previously ELCBs/RCCBs) monitor the current in the live and neutral conductors: any imbalance will cause the device to trip.

2.8.2 RCDs can be installed in an electrical circuit as a protective device, which will rapidly disconnect the mains supply if a fault current is detected. The magnitude of the fault current allowed is preset and in circumstances where shock to persons is anticipated this should be between 10mA and 30mA and trip the supply within 30mS. This limits the energy, which may be passed through the body. RCDs for protection against fire may have a preset sensitivity of up to 100mA. RCDs will not protect a person touching both live and neutral conductors.

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The IET Regulations state that all installations outside the equipotential zone, i.e. external/outdoor from the main installation should be protected by RCDs. The Regulations make it clear, however, that reliance on this form of protection is not acceptable as the sole or main means of protecting persons from electric shock. RCDs may only be used as a useful backup to primary safeguards such as insulation, enclosure, low voltage etc. In addition, the latest (18th) Edition of the Regulations requires that all concealed wiring is protected by an RCD.

2.8.3 Control gear circuits associated with 400/415V 3-phase equipment should be operated at a maximum of 110V AC from an isolating transformer with one side of the winding earthed.

2.9 ELECTRIC SPACE HEATERS

2.9.1 Privately-owned heaters may not be used in the Railway Centre. If under special circumstances the Society considers it necessary to provide a heater, the Facility Manager will ensure that it is checked regularly.

2.9.2 The use of radiant electric fires is specifically prohibited. Their unauthorised use in the past has been the cause of a number of accidents including life-threatening fires.

Fan heaters are also to be considered carefully, as the failure of the fan can cause the heating elements to overheat leading to a fire risk.

The preference, given that the site location dictates the use of electric heating, is for 'black heat' convector heaters, storage heaters or heat pump units.

3 COMMERCIAL ELECTRICAL EQUIPMENT

3.1 This applies to Facilities with no staff approved for the construction, repair and maintenance of equipment and fixed installation and who use only commercially produced equipment.

3.2 Where standard commercial equipment is in use the correct fuse/overcurrent device should be fitted. Contact with live parts must be prevented by enclosure, isolation or by some other effective means.

3.3 The equipment should be visually checked before being put into use to ensure initial safe condition.

4 CHECKS BEFORE USE

4.1 Manufacturers of any electrical equipment have a legal obligation to ensure that it is safe when properly used. Provided that the correct fuse has been fitted, commercial equipment should be safe without modification. However, instructions given by the manufacturer should be brought to the attention of all users.

4.2 When older equipment is brought into use, arrangements must be made to ensure that it conforms to current safety standards, and that its condition is such that the original built-in safety has not been degraded by wear or misuse.

4.3 It is the Facility Manager's responsibility to ensure that all electrical equipment is PAT tested, is in date and safe to use. In case of doubt, reference should be made to a competent person

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4.4 230/240V Equipment to be used out of doors should be fitted with suitable weatherproof connectors (eg BS4343) and only connected to an outlet protected by a residual current device (RCD) to provide optimum protection. In such cases, advice is available from the Electrical Department. It should be noted, however, that the use of RCDs cannot be regarded as replacing primary safety features (enclosure, insulation, etc.).

4.5 Particular attention is drawn to the high standards of maintenance needed in respect of 'hard use' electrical appliances. Visual checks of plugs, power cables, connections (at plug and appliance ends) should be frequently carried out and users instructed as to action to be taken if and when unsafe conditions are identified. The term 'hard use' includes all hand tools, *and associated extension leads*, and may also include the following:

Electric Drills, Grinders etc
Vacuum cleaners
Floor scrubbers/polishers
Horticultural/gardening equipment
Mains powered radios/tape players and any other AV equipment
Floor/desk/table/inspection lamps
Portable kitchen appliances
Welding Rod Ovens/Quivers
Soldering irons

and most other equipment which is frequently moved about, plugged and unplugged, or which is subject to added stresses from handling, wet, heat or corrosion.

5 MAINTENANCE

5.1 It is the Facility Manager's responsibility to ensure that electrical equipment used in the Facility is maintained in a safe condition and that the condition of all appliances is kept under review so as to prevent danger.

5.2 The most important arrangement to be made is a visual check of the condition of the connecting cables and of the plug. The connecting cable must be undamaged and securely fastened both at the appliance end and at the plug ends. The plug must be undamaged and must not rattle, which may indicate loose terminals and potential danger. Check for visual evidence (blackening, scorching, etc.) of arcing or overheating. Any apparent defect must be investigated and remedial action taken.

5.3 A full electrical test must be undertaken from time to time. The frequency of tests depends on the amount, type and conditions of use. A good guide is contained in the HSE leaflet, Maintaining Portable Electrical Equipment. Testing and records of the test should be arranged by Facility Managers in conjunction with the Electrical Department, who will keep records of tests and arrange for a label to be securely attached to the equipment so that the test history can be checked. A copy of test records is to be kept by the Operations Manager. Such tests should also form part of any repair procedures. (It should be noted that many service contracts will be concerned only with the correct functioning of the equipment and not with its electrical safety).

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6 SUMMARY

- 6.1 Users should be instructed in the safe methods of use of electrical equipment and should be warned of the hazards of using unsafe equipment.
- 6.2 They should be made aware of the need to make frequent visual checks of the condition of cables and plugs.
- 6.3 Facility Managers should ensure that electrical equipment is safe to use when installed and remains so by regular checking and maintenance at appropriate intervals. Facility Managers may choose to sub-contract such maintenance but it remains their responsibility to initiate and monitor any arrangement.

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APPENDIX

Electrical Safety and You ISBN:9780717664764 Latest version published in April 2012 and is available free on the internet at http://www.hse.gov.uk/pubns/indg231.pdf	HSE Publication	INDG 231(REV 1)
Electrical Safety on Construction Sites ISBN 9780717610006, published by HSE 24 August 1995. This publication has been superceded by the following three publications:-	HSE Publication	HSG 141
Electricity at Work Safe Working Practices ISBN: 9780717665815 https://www.hse.gov.uk/pubns/books/hsg85.htm		HSG 85
Health and Safety in Construction https://www.hse.gov.uk/pubns/books/hsg150.htm		HSG 150
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