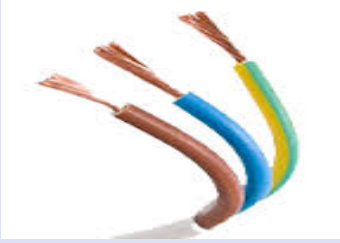
Safety Services Guidance



Guidance on the maintenance of Electrical Equipment

Key word(s):	Electricity at Work Regulations; electrical equipment; Portable Appliance Testing (PAT); fixed, transportable and portable equipment; maintenance; repair; replacement; visual inspection
Target audience:	Heads of School, Heads of School Administration; Directorate of Estates and Facilities; Faculties; staff, students and visitors

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Introduction

1. The Electricity at Work Regulations 1989 places a legal duty on the University to prevent injury to staff, students, contractors and visitors from its electrical systems. It is essential that electrical equipment is properly maintained so as to prevent danger. This document details the University's approach to ensuring electrical equipment is safe and remains so.

Responsibilities

2. The University Board of Governors has delegated responsibility for electrical safety as follows.

3. **It is the responsibility of the Director of Estates and Facilities** to ensure that (i) the fixed wiring of every University owned/managed building and (ii) centrally provided equipment eg lifts, air conditioning units etc. are inspected, tested and maintained on a regular basis by competent persons in accordance with the Electricity at Work Regulations and the Institute of Electrical Engineers (IEE) Code of Practice for In-Service Inspection & Testing of Electrical Equipment. Appropriate records are to be kept.

4. **It is the responsibility of each Head of School or Head of Administrative Directorate (or equivalent)** to ensure all their electrical equipment – fixed, transportable and portable is inspected, tested and maintained at regular intervals in accordance with the Electricity at Work Regulations and the IEE Code of Practice for In-Service Inspection & Testing of Electrical Equipment.

5. **New electrical equipment** – should be visually inspected for condition before use. Any new equipment that does not have a mark of conformity (CE mark) should be subject to a full combined inspection and test prior to first putting it into service / use.

6. A CE mark is not a quality mark, or a guarantee that the product meets all of the requirements of the relevant European Union (EU) product safety law. Suppliers who install work equipment and users should make reasonable checks of any new products.

7. Domestic equipment from outside the UK should be fitted with 13A BS1363 plug top and suitably fused.

8. The frequency of inspection and testing will depend on the equipment, use, location etc. The Head of School / Faculty / Directorate may need to make use of

a competent person to advise him / her on the appropriate frequency of testing and on the tests to be performed.

9. Testing and inspection must only be carried out by personnel who are competent in testing and inspection of the types of equipment submitted for testing. Personnel who perform testing can be University employees or external contractors who are members of a recognized electrical contracting association. The Directorate of Estates and Facilities use approved contractors from the North West Universities Purchasing Consortium (NWUPC) framework for portable appliance testing (PAT). Further advice can be obtained from the Directorate of Estates and Facilities Principal Electrical Engineer.

10. **It is the responsibility of each Head of School / Head of Administrative Directorate / Division** to ensure that members of staff are familiar with the hazards of the electrical equipment they are to use and understand basic safety precautions.

11. **It is the responsibility of every member of staff, student, contractor and visitor** to take care of their own safety and that of others. They must not use or allow the use of equipment which is obviously faulty. They must visually check each piece of electrical equipment before it is used.

Maintaining (including testing of) Portable and Transportable Electrical Equipment

12. Maintenance – employers have a responsibility under Regulation 4(2) of the Electricity at Work Regulations 1989 to maintain portable and transportable electrical equipment so as to prevent danger. The Health & Safety Executive (HSE) sees maintenance comprising:

    - A visual inspection of appliances. This comprises a daily check by the user for hand held and hand operated items AND a formal check at set intervals by a nominated person for all appliances which operate at mains voltage.
    - Electrical testing of all appliances in accordance with the recommendations of the Code of Practice for In-service Testing & Inspection.
    - Repair and replacement consequent to both points above.

13. Visual inspection by users – from time to time all users must look critically at the electrical equipment they use. This needs to be daily and before use in the case of hand held and hand operated appliances to check that the equipment is in sound condition.

What to check for:-

- damage, eg cuts, abrasion (apart from light scuffing) to the cable covering;
- damage to plug, eg is the casing cracked or the pins bent;
- non-standard joints including taped joints in the cable;
- the outer covering (sheath) of the cable not being gripped where it enters the plug or the equipment;
- equipment that has been used in conditions where it is not suitable, eg a wet or dusty workplace;
- damage to the outer cover of the equipment or obvious loose parts or screws;
- signs of overheating (burn marks or staining).

14. The checks also apply to extension leads, associated plugs and sockets. Any faults must be reported to the line manager and the equipment taken out of use immediately and labelled as faulty including a brief explanation. It must not be used again until repaired.

Note: Equipment which exhibits intermittent faults should be taken out of service and not used again until thoroughly checked out by a competent person and the source of the fault identified and rectified.

15. **Formal Visual Inspection by a Competent Person** – Only a competent person should carry out a formal visual inspection. These must take place at set intervals, dependent on risk. Formal inspections should include:

    - Installed and operated in accordance with manufacturer's instructions;
    - Suitability of the equipment in the environment;
    - Switching off of the equipment to check functionality, carry out maintenance or isolate in the case of an emergency;
    - User feedback, check with user on operation, issues found etc;
        - the appropriate sized fuse is being used;
        - the cord grip is holding the outer part (sheath) of the cable tightly;
        - the wires, including the earth where fitted, are attached to the correct terminals;
        - no bare wire is visible other than at the terminals;
        - the terminal screws are tight; and
        - there is no sign of internal damage, overheating or entry of liquid, dust or dirt.

A suggested frequency for formal visual inspections is given in table 1 below.

16. The HSE states that the formal visual inspection can be carried out by a sensible member of staff (called a 'nominated person' in this document), provided they have enough knowledge, skills and training. They need to be able to avoid danger to themselves and others. They should have basic electrical knowledge together with common sense eg switch off and unplug equipment first. They must also know when the limit of knowledge and experience has been reached.

17. Testing Of Portable Electrical Equipment – for earth / insulation integrity eg using a portable appliance tester, will be required in addition to a visual inspection (it is called 'combined inspection and testing' by the HSE):

    - whenever there is a reason to suppose the equipment may be defective (but this cannot be confirmed by visual inspection);
    - after any repair, modification or similar work;
    - at regular intervals (these intervals will be determined by carrying out a risk assessment which will consider the equipment, the manner of use, frequency of use and the environment).

18. A visual inspection must also be carried out in conjunction with the electrical testing. It should include the points referred to in paragraph 12.

19. Combined inspection and testing should be carried out by someone with a wider degree of competence than that required for visual inspection alone. This is because the results of the tests may require interpretation and appropriate electrical knowledge. This work can, however, often be carried out by an existing employee. Such persons may need training. The Staff Learning and Development Unit offer courses to train staff to carry out this basic testing.

20. As the table below shows, it is NOT a legal requirement to test portable equipment annually. The inspection and test intervals should be determined on the basis of risk. However, it is sometimes convenient to arrange for annual testing of all appliances, if the testers are on site to look at some of them.

21. **Maintaining records** – strictly speaking, this is not required by law but the HSE state "*you may find it helpful if you have a lot of electrical equipment to keep track of and also to help you review your maintenance procedures. Experience of faults found will determine whether inspection intervals can be lengthened and whether and how often there should be a combined inspection and test*".

22. Schools / Faculties / Directorates are recommended to record both formal visual and electrical checks except where the number of items to be maintained is low.

The evidence of records would help in any legal case following an accident involving electrical appliances.

23. Where records are kept, items of equipment need to be easily identifiable eg bear unique numbers, so the test results can be linked directly to the items. Keeping separate records of faults found will also assist in directing the test program to vulnerable areas.

24. Frequency Of Inspection – the initial frequency for inspection / testing suggested by the HSE follows. This frequency can be shortened or lengthened in the light of practical experience i.e. number of faults which appear.

25. If Heads of Schools have difficulty in deciding how often to inspect / test they should seek advice from competent persons from inside or outside the University. The Principal Electrical Engineer may be able to offer guidance in this area.

Initial Frequency of Checks Suggested by the HSE

A. Higher Risk Environments

26. The HSE suggest that in commercial settings formal visual inspections should be carried out every 3 months and combined inspection and electrical tests every 6-12 months

27. Heads of Schools in 'practical areas' will need to bear this figure in mind when drawing up a schedule for testing in their School. It is quite likely that different inspection intervals will be required for laboratories, offices, and other areas. Experience will decide (hence keeping of records is helpful).

B. Offices and other low-risk environments

Table 1

Equipment / environment	User checks	Formal visual inspection	Combined inspection & testing
Battery-operated: (less than 20 volts)	No	No	No
Extra low voltage: (less than 50 volts AC) eg telephone equipment, low voltage desk lights	No	No	No
Information technology: eg desktop computers, VDU screens	No	Yes, 2-4 years	No if double insulated, otherwise up to 5 years
Double insulated equipment: NOT hand-held. Moved occasionally, eg fans, table lamps, slide projectors	No	Yes, 2-4 years	No
Double insulated equipment: HAND-HELD eg some floor cleaners	Yes	Yes, 6 months - 1 year	No
Earthed equipment (Class 1) eg electric kettles, some floor cleaners	Yes	Yes, 6 months - 1 year	Yes, 1-2 years
(a) Cables (leads) and plugs connected to the above equipment and	Yes	Yes, 6 months - 4 years	Yes, 1-5 Years
(b) Extension leads		Yes, 3 months	Annually

Maintaining Fixed Electrical Equipment

28. The requirement under Regulation 4(2) Electricity at Work Regulations to maintain (and test) portable and transportable electrical equipment also applies to fixed items of electrical equipment owned by a School / Faculty / Directorate. 'Fixed items' covers those electrical items wired directly into the mains without use of a plug. The range of this type of equipment in the University is vast, ranging from a wall mounted electric water heater, large laboratory centrifuges, lathes in workshops to liquid nitrogen plants.

29. The maintenance requirement on fixed appliances mirrors that of portable ones – visual check, earth continuity and insulation integrity tests.

30. HSE document HSR25 entitled 'The Electricity at Work Regulations 1989' states that advice on inspection and testing of fixed installations can be found in British Standards, and IEE Wiring Regulations.

31. Schools / Facilities who have fixed appliances will need to contact the Directorate of Estates and Facilities Principal Electrical Engineer for permission prior to carrying out this work (whether they intend to do this work themselves or engage others to do it for them).

32. The frequency of the electrical tests is likely to be of the order of 5 years. However, this will need to be decided on a case by case basis by carrying out a risk assessment. Estates and Facilities complete Fixed Appliance Testing on general use items as part of the 5 yearly Electrical Installation Test and Inspection. General use items may include Hand-dryers, Cookers, Zip Boilers, Water Coolers etc, but **will not include** School / Faculty equipment / test rigs etc.

Advice for staff and students in the use of electrical equipment

33. The Electricity at Work Regulations 1989 place a duty on the University to train users to appreciate the dangers which could arise from incorrect / improper use of electrical equipment. The following 'helpful hints' below should help staff and students to avoid the main dangers presented by the use of electricity in the University namely shock, fire and burns. This Guidance could be incorporated into a Safety Policy.

34. The Health and Safety at Work Act requires people at work to be responsible for their own safety and the safety of others, and this includes not using equipment which is obviously defective. Every member of staff and every student or visitor must regularly check the electrical equipment they intend to use (or intend to give to others to use) to ensure no defects are apparent.

35. Employees (and others) must:

- Not use any equipment which is defective or damaged. Label the item 'out of order' (sign and date the note) to prevent others using it, and lock the item away if safe and practical to do so. Report the defect immediately to the Supervisor / Manager.
- Make no attempt to repair or make alterations to equipment or remove permanently fixed covers from equipment (unless competent to do so).
- Always switch off and unplug equipment before cleaning and fitting new parts (where competent to do so).

- Always remove plugs from sockets by holding the plug and not by pulling on the cord, or move equipment by pulling on the cord.
- Avoid food and drink coming into contact with electrical equipment, such as VDU keyboards.
- Seek permission from the Head of School before bringing personal items of electrical equipment into the University for use. Any such personal items of equipment must be safe and be included in the regular departmental testing scheme where such a regime is in place.
- Route trailing cables away from walkways where passers-by may trip or drag the equipment off the desk / worktop. Rubber coving for floor mounted cables is a sensible course of action.
- Avoid socket adapters which enable more than one plug to be plugged in to a single socket. Trailing socket boards are a better but not fool proof alternative.
- The use of 'continental converter plugs' is discouraged due to the quality of the items. Only continental converter plugs that are CE marked may be considered for use.
- Stop and ask your supervisor if you don't know if something is 'right' or suspect something is 'wrong'.

References

The Electricity at Work Regulations 1989 Regulations are supported by numerous Health and Safety Executive publications. Some of these publications are free and can be seen on the Health & Safety Executive's web sites eg

HSE – PUBLICATIONS: Free Leaflets HSR 25 The Electricity at Work Regulations 1989. ISBN 978 0 7176 6228 9

INDG 231 'Electrical Safety and You'

Safety in electrical testing: Servicing and repair of audio, TV and computer equipment (Engineering Information Sheet 36)

More detailed HSE publications, for which there is a charge, may be found by accessing: HSE Books – Home and running a search for 'electrical safety'

These priced documents can be bought on-line or are available from the Stationery Office, Princess St, Manchester. It is also possible to view them via the John Rylands University Library electronic database Info4Education (OHSIS) – Athens password required.

Guidance on various electrical topics is also available from the Institution of Engineering and Technology, P.O. Box 96, Stevenage, Herts., SG1 2SD at their Web site.

(1) Code of Practice for In-Service Inspection and Testing of Electrical Equipment 4th Edition. ISBN 978-1-84919-626-0.

(2) 17th Edition I.E.E. Wiring Regulations (BS 7671:2015)

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