



Introduction

Pat testing or portable appliance testing is an important part of any health & safety policy. This information is intended as a guide to both the legal implications and to the technical requirements.

The Health & Safety Executive states that 25% of all reportable electrical accidents involve portable appliances. The Electricity at Work Regulations place a **legal responsibility on employers, employees and self-employed persons to comply with the provisions of the regulations and take reasonably practicable steps to ensure that no danger results from the use of such equipment. This in effect requires the implementation of a systematic and regular program of maintenance, inspection and testing.** The Health & Safety at Work Act (1974) places such an obligation in the following circumstances:

1. Where appliances are used by employees.
2. Where the public may use appliances in establishments such as dental practices, schools, hotels, shops, etc.
3. Where appliances are supplied (landlords to tenants) or hired.
4. Where appliances are repaired or serviced.

The level of inspection and testing required is dependant upon the risk of the appliance becoming faulty, which is in turn dependant upon the type of appliance, the nature of its use and the environment in which it is used.

Legal Requirements for electrical maintenance

The Health & Safety at Work Act 1974 puts the **duty of care** upon both the employer and the employee to ensure the safety of all persons using the work premises. This includes the self employed.

The Management of Health & Safety at Work Regulations 1999 states:

"Every employer shall make **suitable and sufficient assessment** of:

- (a) the risks to the health and safety of his employees to which they are exposed whilst at work, and

(b) the risks to ensure the health and safety of persons not in his employment arising out of or in connection with the conduct by him or his undertaking."

The Provision and Use of Work Equipment Regulations 1998 states

"Every employer shall ensure that work equipment is **maintained** in an efficient state, in efficient working order and in good repair."

This includes all work equipment (fixed, transportable or portable) connected to a source of electrical energy.

The Electricity at Work Regulations 1989 states:

"'Electrical Equipment' includes anything used, intended to be used or installed for use, to generate, provide, transmit, transform, rectify, convert, conduct, distribute, control, store, measure or use electrical energy."

Scope of the legislation

It is clear that the combination of the HSW Act 1974, the PUWER 1998 and the EAW Regulations 1989 apply to all electrical equipment used in, or associated with, places of work. The scope extends from distribution systems down to the **smallest piece of electrical equipment**.

It is clear that there is a requirement to **inspect and test** all types of electrical equipment in all work situations.

Who is Responsible

The Provision and Use of Work Equipment Regulations 1998 requires, **every employer** to ensure that work equipment is suitable for the purpose for which it is provided, only used in the place and under the provisions for which it is provided. It also requires **every employer** to ensure work equipment be efficiently **maintained** and kept **fit and suitable** for its intended purpose. It must not be allowed to deteriorate in function or performance to such a level that it puts people at risk. This means that **regular, routine and planned maintenance regimes** must be considered if hazardous problems can arise.

Regulation 3 of the Electricity at Work Regulations 1989 recognises a responsibility that **employers and many employees** have for electrical systems.

"It shall be the duty of every employer and self employed person to comply with the provisions of the Regulations in so far as they relate to matters which are within his control."

It shall be the duty of every **employee** while at work:

(a) to co-operate with his employer so far as is necessary to enable and duty placed on that employer by the provision of the Regulations to be complied with: and

(b) to comply with the provision of these regulations in so far as they relate to matters which are within his control."

Record Keeping is essential

It has been seen that it is a defense under Regulation 29 of the Electricity at Work Regulations for the **person responsible** to 'prove that he/she took all reasonable steps and exercised all due diligence to avoid the commission of that offence'. It seems clear that the most effective method by which the **person responsible** can prove this in court would be by producing records. Records are essential if a proper and organised system of testing is to be established.

Landlord Legal Requirements

Anyone who lets residential accommodation (such as houses, flats and bedsits, holiday homes, caravans and boats) as a business activity is required by law to ensure the equipment they supply as part of the tenancy is safe.

The Electrical Equipment (Safety) Regulations 1994 requires that all mains electrical equipment (cookers, washing machines, kettles, etc), new or second-hand, supplied with the accommodation must be safe. Landlords therefore need to regularly maintain the electrical equipment they supply to ensure it is safe.

The supply of goods occurs at the time of the tenancy contract. It is, therefore, essential that property is checked prior to the tenancy to ensure that all goods supplied are in a safe condition. A record should be made of the goods supplied as part of the tenancy agreement and of checks made on those goods. The record should indicate who carried out the checks and when they did it.

It is strongly advisable to have the equipment checked before the start of each let. It would be good practice to have the equipment checked at regular intervals thereafter. You should obtain and retain test reports detailing the equipment, the tests carried out and the results.

Portable Appliance Equipment

The IEE Code of Practice gives guidance on the various equipment types:

Portable appliance

An appliance of less than 18kg in mass that is intended to be moved whilst in operation or an appliance which can easily be moved from one place to another, e.g. vacuum cleaner, kettle, etc.

Movable equipment (transportable)

This equipment is either:

18 kg or less in mass and not fixed, e.g. electric fire.

or

Equipment with wheels, castors or other means to facilitate movement by the operator as required to perform its intended use, e.g. air conditioning unit

Hand Held equipment or appliances

This is portable equipment intended to be held in the hand during normal use, e.g. hair dryer

Stationary equipment or appliances

This equipment has a mass exceeding 18kg and is not provided with a carrying handle, e.g. refrigerator

Fixed Equipment/appliances

This equipment or an appliance which is fastened to a support or otherwise secured in a specific location, e.g. bathroom heater

Appliances/equipment for building in

This equipment is intended to be installed in a prepared recess such as a cupboard or similar. In general, equipment for building in does not have exposure on all sides because one or more of the sides, additional protection against electrical shock is provided by the surroundings, e.g. built in electric cooker

Information technology equipment

Information technology equipment includes electrical business equipment such as computers, printers, other peripherals e.g. VDUs, scanners, photo-copiers

Assessing the frequency of testing

The Memorandum of Guidance on the Electricity at Work Regulations suggests that 'regular inspection of equipment is an essential part of any preventative maintenance program'.

The factors which effect the frequency of testing must be assessed by the person responsible.

The **frequency of inspection & testing required** will vary depending on the following.

The **environment** – Equipment installed in a benign environment is likely to suffer less damage than equipment in an arduous environment.

The **users** – If users report damage promptly hazards will be avoided. Conversely, if equipment is likely to receive unreported abuse, more frequent inspection & testing is required.

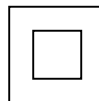
The **equipment construction** – The safety of Class 1 equipment is dependent upon a connection with earth. If the flexible cable is damaged the connection with earth can be lost. Class 2 equipment is not dependent upon a fixed earth.

The **equipment type** – Appliances that are hand-held are more likely to be damaged than fixed appliances. If they are Class 1 the risk of danger is increased, as the safety is dependant upon the continuity of the protective conductor from the plug to the appliance.

Typical **Class 1** have live parts protected by basic insulation and if this fails then protection against shock is by earth connection supplied in the supply cable to the fixed wiring. Items include toasters, kettles, washing machines, fridge, freezer, cooker, cooker fan, tumble drier, extension leads, compressors, TV.

Typical **Class 2** have double insulation to live parts with no need for earth connection as seen by use of 2 core cable. Items include lamps, food mixers, hedge trimmers, drills, irons, laminators, shredders, heaters, radio, coffee machines, hair driers and many IT equipment.

All **Class 2** appliances should display a sign



Remember **all sockets, electric leads and switches must** be tested.

The following table provides guidance on the initial frequencies of inspection & testing. However, the frequency must depend upon the factors listed above and should be kept under constant review.

The IEE Suggested Initial Frequency of Inspection & Testing (PAT Testing) of Class 1 Equipment.			
Type of premises	Type of equipment	Formal visual inspection	Combined inspection & testing
Businesses Offices & Shops	Stationary equipment	24 months	48 months
	IT equipment	24 months	48 months
	Movable equipment	12 months	24 months
	Portable equipment	12 months	24 months
	Hand-held equipment	6 months	12 months
Hotels	Stationary equipment	24 months	48 months
	IT equipment	24 months	48 months
	Movable equipment	12 months	24 months
	Portable equipment	12 months	24 months
	Hand-held equipment	6 months	12 months
Equipment used by the public including tenants	Stationary equipment	Monthly	12 months
	IT equipment	Monthly	12 months
	Movable equipment	Weekly	6 months
	Portable equipment	Weekly	6 months
	Hand-held equipment	Weekly	6 months
Industrial	Stationary equipment	None	12 months
	IT equipment	None	12 months
	Movable equipment	Monthly	6 months
	Portable equipment	Monthly	6 months
	Hand-held equipment	Monthly	6 months
Schools	Stationary equipment	None	12 months
	IT equipment	None	12 months
	Movable equipment	4 months	12 months
	Portable equipment	4 months	12 months
	Hand-held equipment	4 months	12 months

In-Service testing will involve the following:

- (a) **Preliminary inspection**
- (b) **Earth continuity tests** (for Class 1 equipment)
- (c) **Insulation testing** (Which may sometimes be substituted by earth leakage measurement)
- (d) **Functional checks.**

Electrical testing should be performed by a person who is **competent** in the safe use of the test equipment and who knows how to interpret the test results obtained. This person must be capable of inspecting the equipment and, where necessary, dismantling it to check the cable connections.

If equipment is permanently connected to the fixed installation, e.g. by a flex outlet or other accessory, the accessory will need to be detached from its box or enclosure so that the connections can be inspected. Such work should only be carried out by a **competent** person.

Visual Inspection

Formal visual inspections should only be carried out by persons competent to do so. The results of the inspection must be documented.

The following must be considered when carrying out the inspection

Suitability of the equipment/environment

The equipment should be assessed for its suitability for the environment or the nature of the work being undertaken.

Good Housekeeping

A check should be made to ensure the equipment is installed and is being operated in accordance with the manufacturers instructions. In addition, the following are examples of items which should be checked:

- (a) Cables located so as to avoid damage
- (b) Means of disconnection/isolation readily accessible
- (c) Adequate equipment ventilation
- (d) Cups, plants and work material correctly placed to avoid spillage
- (e) Equipment positioned to avoid strain on cord
- (f) Equipment is being operated with the covers in place, doors are closed
- (g) Indiscriminate use of multi-way adaptors / trailing sockets is avoided
- (h) No unprotected cables run under carpets.

Disconnection of equipment

The means of isolation from the electricity supply must be readily accessible to the user, i.e. in normal circumstances it must be possible to reach the plug and socket without too much difficulty.

The condition of the equipment

Prior to the commencement of the users should be asked if they are aware of any faults and if the equipment works correctly. The following items need to be inspected:

- (a) The flexible cable
- (b) The socket outlet, if known
- (c) The appliance
- (d) The plug head.

Some of the following checks may not be possible for equipment fitted with a non-rewirable plug

- (a) Check detachable power cords to Class 1 equipment
- (b) Identify signs of overheating
- (c) Internal inspection; cord security, polarity, connections
- (d) If non-rewirable plug; cord security, burning odours
- (e) Correct size fuse fitted, BS marked, ASTA marked
- (f) Security of plug cover
- (g) Check the flexible cable connections and its security at the equipment.



Electrical tests

Electrical testing of portable equipment will involve the following:

- (1) Earth bond continuity tests
- (2) Insulation resistance testing
- (3) Functional checks

(a) Earth Bond Test (Class 1 equipment only):

Readings should show less than $0.1+R$ Ohms (where R is the resistance of the lead)

Tested at a current of 1.5 times the rating of the fuse and no greater than 25A for a period of between 5 and 20 seconds or with a short-circuit test current within the range 20mA to 200mA.

(b) Insulation Resistance Test:

The applied test voltage should be approximately 500 Volts DC

Class 1 Heating equipment < 3kW 0.3M Ohms

Class 1 All other equipment 1M Ohms

Class 2 Equipment 2M Ohms

(c) Earth Leakage Test:

Class 1 Handheld Appliances 0.75mA

Other Class 1 Appliances 3.5mA

Class 2 Appliances 0.25mA

Managing electrical safety

Employers must carry out a risk assessment to identify potential workplace electrical hazards. This will enable appropriate control measures to be implemented.

General precautions - Always ensure that:

- For any electrical equipment, socket-outlets / cut off power switches are close by so that equipment can be easily disconnected in an emergency.
- Double adaptors are not used.
- The wattage of all bulbs in light fixtures and lamps are checked to make sure they are the correct wattage. Replace bulbs that have a higher wattage than recommended to prevent overheating that could lead to a fire.
- Lightbulbs and other equipment which could easily be damaged in use are protected. There is a risk of electric shock if they are broken.
- Suspect or faulty equipment is taken out of use, labelled 'DO NOT USE' and kept secure until examined by a competent person.
- Where possible, tools and power socket-outlets should be switched off before plugging in or unplugging.
- Equipment is switched off and/or unplugged before cleaning or making adjustments.
- There is provision for all equipment to be stored carefully, securely and safely.
- Workers using electrical equipment are trained and supervised.
- Electrical installations are safe eg, by providing enough power outlets.
- Worn or frayed cords are replaced.
- Leads, wiring and cables are in good condition and in the correct position.
- PVC insulation tape should not be used to repair damaged cords. Have the cords replaced.
- Enough socket outlets are provided – overloading socket outlets by using adaptors can cause fires.
- All connections to power points are made using the correct plugs.
- Isolating transformers and residual current devices (RCD) are used.

- The electricity supply is isolated from earth and has a voltage between conductors not exceeding 230 volts.
- Equipment suitable for the working environment is used, eg, cordless tools for wet and damp conditions.
- The main board is locked and the switches are safe and identified.

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