ALTERNATIVE PROVISION

PAT Testing

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Approved by: RAISE-AP Educational Directors

Approval Signatures

RAISE-AP
Directors

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Introduction

RAISE AP understands that students and staff enjoy hot drinks whilst they are on provision premises and is aware of the benefits associated with hot drinks; however, students and staff are required to take precautionary measures, in order to mitigate the risks associated with hot drinks.

RAISE AP recognises and accepts its responsibility for providing a safe environment for all employees and students regarding electrical safety at work. To aid this the provision will perform an annual inspection of portable appliances (PAT) to ensure electricity at Work Regulations 1989 are complied with.

PAT testing or Portable Appliance Testing of electrical equipment is an important part of any Health & Safety Policy. 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. It is clear that there is a requirement to inspect and test all types of electrical equipment in all work situations regardless of ownership.

The Health & Safety at Work Act (1974) places such an obligation in the following circumstances:

- Where appliances are used by employees.
- Where the public may use appliances in establishments such as hospitals, schools, hotels, shops etc.
- Where appliances are supplied or hired.
- Where appliances are repaired or serviced.

Employee Responsibility

It is the duty of all employees under section 7 of the Health and Safety at Work Act 1974, to take reasonable care for the lives of themselves and others that may be affected by their acts and omissions.

Every employee MUST:

- Comply with all safety instructions.
- Co-operate with the company so as to enable it to carry out its own responsibilities successfully.
- Not wilfully misuse or interfere with any item provided in the interests of health, safety or welfare.

PAT Testing

There are many European standards and guidance notes regarding portable appliances and equipment, though they do not establish a common and specific definition of such equipment. Even so, there does seem to be a consensus of opinion that such equipment is either handheld whilst being connected to the supply, or is intended to be moved whilst connected to the supply, or is capable of being moved without undue difficulty whilst connected to the supply.

It is usual for this equipment to be connected to the supply via a plug and socket however this is not a requirement for electrical equipment to be deemed portable or transportable. It is common to define a portable appliance by saying that it is 'anything with a plug top on the end of it'. This is a mistake as it may mean that there are some appliances in the system that are never tested.

The National Association of Professional Inspectors and Testers define a portable appliance as 'any electrical item which can or is intended, to be moved whilst connected to an electrical supply.'

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, toaster, food mixer, 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.

Handheld 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 or Appliances

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

Built in Appliances

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

ICT/AV Equipment

Information technology equipment includes electrical business equipment such as computers and mains powered telecommunications equipment, and other equipment for general business use, such as mail processing machines, VDU's photocopiers.

Frequency of Testing

The following table shows the required testing periods for equipment in the provision. To ensure testing occurs within regulation it is categorised by room rather than item.

Department / room	User checks	Formal inspection	Combined inspection and test
Staff room / kitchen		Caretaker each term	12 months
General classroom			24 months
Toilets		Caretaker each term	12 months
Cleaning equipment	Before each use	Caretaker each term	12 months
Offices			24 months

* RAISE AP aim to test all areas annually

In-Service Testing

The IEE Code of Practice recognises four test situations.

1. Type Testing to an appropriate standard
2. Production testing
3. In-Service testing
4. Testing after repair

This document is limited in covering topics concerned with In Service Testing only.

This is the testing carried out as a routine to determine whether the equipment is in a satisfactory condition.

In-Service testing will involve the following:

- Preliminary inspection
- Earth continuity tests (for Class 1 equipment)
- Insulation testing (Which may sometimes be substituted by earth leakage measurement)
- 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.

Testing

The Electricity at Work regulations states that:

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

The IEE Code of Practice states, those carrying out the inspection and testing must be competent to undertake the inspection and, where appropriate, testing of electrical equipment and appliances having due regard for their own safety and that of others.

What should be considered is that the 'danger' to be prevented, includes not just the dangers, which may arise during the testing procedure to the tester and others, but also the dangers, which may arise at a later date as a result of using equipment, which has not been effectively tested.

The tester must have an understanding of the modes of electrical, mechanical or thermal damage to electrical equipment and appliances and their flexes, which may be encountered in any environment.

Training must include the identification of equipment and appliance types to determine the test procedures and frequency of inspection and testing. Person's testing must be familiar with the test instruments used their limitations and restrictions so as to achieve repeatable results without damaging the equipment or the appliance.

Visual Inspections

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

Suitability of Equipment and Environment

The equipment should be assessed for its suitability for the environment or the nature of the work being undertaken. When the work environment is harsh or hazardous particular care needs to be taken when selecting the equipment and assessing the frequency of inspection and testing.

Good Housekeeping

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

- Cables located so as to avoid damage
- Means of disconnection/isolation readily accessible
- Adequate equipment ventilation
- Cups, plants and work material correctly placed to avoid spillage
- Equipment positioned to avoid strain on cord
- Equipment is being operated with the covers in place, and any doors are closed
- Indiscriminate use of multi-way adaptors and trailing sockets is avoided
- 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.

Condition of 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:

- The flexible cable
- The socket outlet, if known
- The appliance
- The plug head

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

- Check detachable power cords to Class 1 equipment incorporates a CPC
- Identify signs of overheating
- Internal inspection; cord security, polarity, connections
- If non-rewirable plug; cord security, burning odours
- Correct size fuse fitted, BS marked, ASTA marked
- Security of plug cover
- Check the flexible cable connections and anchorage at the equipment, if practical

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Testing

Electrical testing will involve the following:

- Earth bond continuity tests
- Insulation resistance testing
- Functional checks

Earth Bond Testing (Class 1 Equipment)

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.

Insulation Resistance Test

The applied test voltage should be approximately 500 Vdc

Class 1 heating equipment < 3kW 0.3M Ohms
Class 1 All other equipment 1M Ohms
Class 2 Equipment 2M Ohms
Class 3 Equipment 250k Ohms

Optional Tests

Flash Test: No flashover or breakdown shall occur

Operation/Load test: Compare reading with stated details on nameplate

Earth leakage test:

Class 1 Handheld Appliances 0.75mA
Other Class 1 Appliances 3.5mA
Class 2 Appliances 0.25mA

Record Keeping

It has been seen that it is a defence under Regulation 29 of the Electricity at Work Regulations for a duty holder to 'prove that he 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 a duty holder can prove this in court would be by producing records, without which it could be extremely difficult to convince the court that the defendant had acted within either the letter or the spirit of the law. Records are essential if a proper and organised system of testing is to be established.

The keeping of suitable records then is essential. They provide evidence for the defence in the event of a prosecution; more practically, such records enable the close monitoring of the equipment highlighting potential faults or adverse trends.

They are also essential in forming an accurate assessment of the necessary frequency of testing.

For example, if over a number of consecutive test cycles few or no failures were recorded then s/he, duty holder may consider reducing the frequency of tests, obviously the converse may also apply.

Replacement of Appliance Flexes

For flexes to be protected by the fuse in a BS1363 plug there is no limit to their length, providing their cross- sectional areas (CSAs) are below:

3A 0.5mm2
13A 1.25mm2

Other considerations such as voltage drop may limit flex lengths. Smaller CSAs than those given are acceptable if flex lengths are restricted. However, for replacement purposes the above, simplified guidance is appropriate.

The maximum lengths recommended for extension leads are not applicable to appliance flexes or cord sets.

Plug Fuses

For the convenience of users, appliance manufacturers have standardised on two plug fuse ratings- 3A & 13A and adopted appropriate flex sizes. For appliances up to 700W a 3A fuse is used, for those over 700W a 13A fuse is used.

The fuse in the plug is not fitted to protect the appliance, although in practice it often does this. Appliances are generally designed to European standards for use throughout Europe. In most countries the plug is un-fused. If an appliance needs a fuse to comply with the standard it must be fitted within the appliance.

The fuse in the plug protects against faults in the flex and can allow the use of a reduced csa flexible cable. This is advantageous for such appliances as electric blankets, soldering irons and Christmas tree lights, where the flexibility of a small flexible cable is desirable.

References

The Health & Safety at Work Act 1974

The Management of Health & Safety at Work Regulations 1999

The Provision and Use of Work Equipment Regulations 1998

The Electricity at Work Regulations 1989

Raise Values

Our RAISE-AP values (Resolve, Attitude, Invest, Social Skills and Education) are key in everything we do, specifically with attitudes (modelling and expectations), invest (tailoring setup for our young people) social skills (becoming part of a community) which are linked to our PAT Testing.
