



Root3 Automation Ltd

A Guide To Portable Appliance Testing

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1. Definitions

Protective Conductor:

A conductor used for some measures of protection against electric shock and intended for connecting together the exposed-conductive-parts of electrical equipment to the main earth terminal of an electrical installation.

Insulation:

Suitable non-conductive material enclosing, surrounding or supporting a conductor.

Class I Equipment:

Equipment in which protection against electric shock does not rely on basic insulation only, but which includes means for the connection of exposed-conductive-parts to a protective conductor in the fixed wiring of the installation.

Class II Equipment:

Equipment in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions such as supplementary insulation are provided, there being no provision for the connection of exposed metalwork of the equipment to a protective conductor and no reliance upon precautions to be taken in the fixed wiring of the installation.

System

An Electrical system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy and includes such source and such equipment. 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.

Portable Appliance

An appliance that is normally less than 18kg in weight and intended to be moved while in operation or an appliance that can easily be moved from one place to another. Examples being vacuum cleaners, fax machines, kettles, etc.

Transportable Equipment

An appliance that is over 18kg in weight and may be on wheels or other means of movement. Examples being a large High-pressure washer, mobile office air conditioning unit, etc.



2. Legislation & Regulations

The Electricity At work Regulations 1989, Regulation 4(2) states that,

“As may be necessary to prevent danger, all systems shall be maintained so as to prevent, so far as is reasonably practicable, such danger”.

As previously detailed under definitions, electrical Portable Appliances are classified by the Health & Safety Executive and the IEE as a System and therefore fall under the jurisdiction of Regulation 4(2).

This regulation is the driving force for portable appliance testing and as it is all encompassing it could be interpreted in many different ways but what is clear is that portable appliances have to be effectively and correctly maintained.

The regulations require an effective maintenance programme to minimise the likelihood of a dangerous situation arising from a portable appliance. The regulations do not state or require that the maintenance regime should be an extremely expensive and complicated process.

The Management Of Health & Safety At Work Regulations 1999, Regulation 3(1) states that:

“Every Employer shall make a suitable and sufficient assessment of:

- a) The risks to the Health & Safety of his employees to which they are exposed to while they are at work, and*
- b) The risks to the Health & Safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking”.*

This piece of legislation has been introduced to promote the awareness of employers to think about the potential problems that might arise from their employees and persons working for them (eg: Contractors) and therefore taking a more preventative/proactive approach to Health & Safety.

The employer is required to assess the risks of the duties of his employees and to reduce these risks as far as reasonably practicable.



The Provision And Use of Work equipment Regulations 1998 Regulation 4 (1) states that,

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

The term work equipment in connection with electrical apparatus has a very wide meaning and embraces all electrical equipment used in the work place. This regulation is aimed at employers to ensure the equipment that has been provided is suitable for the task involved and that if a Power tool, cement mixer, Fax Machine, Personal Computer is used in the workplace then it is safe for the employee to use without danger.

The Electricity At Work Regulations 1989, Regulation 3, states that

“It shall be the duty of every employer and self-employed person to comply with the provisions of these Regulations in so 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 any duty placed on that employer by the provisions of these regulations to be complied with; and*
- b) To comply with the provisions of these Regulations in so as far as they relate to matters which are within his control.*

This regulation has been written to encompass EVERYONE in the workplace and gives responsibility for electrical safety to employees as well as employers. It is intended to ensure that employers provide a safe environment for their employees and equally the employees must co-operate with the employer on such matters of electrical safety, this may be for example agreeing to and adopting to the employers Health & safety Policies and recommendations.



3. Developing a PAT Testing Programme

The requirements for portable appliance testing have been debated, argued and been confused for some time and as a result employers do get PAT testing wrong. However, there are some fundamental steps that are widely recognised as constituting a robust PAT-testing programme. These include:

- ◆ Risk Assessments
- ◆ User Checks
- ◆ Formal Inspections
- ◆ Electrical Testing
- ◆ Record Keeping

These are discussed in greater detail here.

Risk Assessments

A full Risk assessment detailing and classifying the environment in which the equipment is situated is required. This need not be a long and drawn out exercise as a visual walk around of the workplace should pick up all of the high and low risk areas.

The next stage would be to Compare and evaluate the classification of the environments against the published guidance periods from the Health and Safety Executive in INDG236.

The areas of interest when performing a risk assessment are recommended by the HSE[5] as:

- ◆ Type of equipment and whether or not it is hand held.
- ◆ Manufacturer's recommendations
- ◆ Initial integrity and soundness of equipment
- ◆ Age of the equipment
- ◆ Working environment in which the equipment is used
- ◆ Frequency of use and duty cycle of the equipment
- ◆ Effects of any modifications or repairs to the equipment
- ◆ Analysis of previous records of maintenance, including both formal inspection and combined inspection and testing



User Checks

95% of problems with electrical equipment can be found by ensuring that a regular series of user checks are performed.

These checks can be communicated to the employees by means of a checklist, which can be distributed to all staff, along with other widely distributed information (eg: payslips).

The checklist could also refer to an Intranet link whereby more information can be found if the employees are unsure, and seek clarification.

The HSE [5], recommend the following checks to be undertaken by the user:

- ◆ Damage, e.g. cuts, abrasions (apart from light scuffing) to the cable covering.
- ◆ Damage to the plug, e.g. the casing is cracked or the pins are 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 equipment.
- ◆ Equipment that has been used in conditions where it is not suitable, e.g. a wet or dusty workplace.
- ◆ Damage to the outer cover of the equipment or obvious loose parts or screws.
- ◆ Overheating (burn marks or staining).

It is imperative that the user checklist is explicit on what course of action to take upon discovering defects.



Formal Inspections

The most important part of the maintenance programme is normally the formal inspection. This should be carried out at a frequency determined by the risk assessment, and by a competent person.

The checks should cover all those listed above, but in addition:

- ◆ The fuse is inspected to check that it has not been substituted and that the fuse has a correct rating for the equipment it protects. Particular care should be taken when checking removable mains leads.
- ◆ The terminal connections are checked for tightness, particularly the earth connection on Class I appliances.
- ◆ The cord grip is effective.
- ◆ Good Electrical Housekeeping can be checked, including:
 - ◆ Cables not located where they are at risk of damage
 - ◆ Means of disconnection / isolation easily accessible
 - ◆ Adequate ventilation space is provided and vents / fans are not obscured
 - ◆ Cable not over-flexed causing 'kinking'
 - ◆ No unprotected cable runs under carpets
 - ◆ Over-use of multi-way adapters
 - ◆ Liquids or other hazardous substances are placed too close to the equipment by the user



Electrical Testing

Electrical testing should only be carried out by competent persons.

The frequency of testing will be determined by the outcome of the risk assessment.

The actual testing of appliances will vary depending the type i.e. Class I or Class II equipment

Care must be taken to disconnect communication links for IT equipment while testing appliances

The tests should include the following:

- ◆ Fuse Continuity
- ◆ Earth continuity Test (Only applicable to Class I equipment)
- ◆ Insulation resistance Test

Record Keeping

Current regulations do not mandate record keeping. However, it is recommended by various organisations, including HSE as good practice in the Management of Maintenance programmes

One of the benefits of record keeping is that it provides additional data to improve analysis of the condition of equipment and can be used when reviewing risk assessments.

The record data should be managed appropriately considering the size of the programme, small programmes of a few hundred units will be adequately recorded on a paper—based system, however large programmes benefit from storing the record data electronically, providing access to statistical reports without considerable manual calculation.



4. Summary

- ◆ Maintenance to portable electrical equipment is mandatory.
- ◆ Expensive testing programmes are not mandatory.
- ◆ Assess the risks
- ◆ Use the 'User'
- ◆ Inspect and test where necessary
- ◆ Keep good records



Appendix I - References

This document has been produced with guidance of the following:

- [1] Health & Safety At Work Act 1974
- [2] Electricity at Work Act 1989
- [3] Management of Health & Safety At Work Regulations 1999
- [4] IEE – Code of practice for in-service inspection and testing of electrical equipment
- [5] HSE Guidance notes – Maintaining Portable and Transportable Electrical Equipment
- [6] HSE Guidance notes – Maintaining Portable Electrical Equipment in Offices and Other Low Risk Environments
- [7] Memorandum of guidance on the Electricity At Work Regulations 1989
- [8] BS 7671 – IEE Wiring Regulations Sixteenth Edition



Appendix II - About this guide

This guide has been produced to provide an awareness of the statutory requirements for Portable Appliance Testing and is our interpretation only. It does not represent a comprehensive appraisal of the Regulations or recommendations of the documents referenced and must therefore not be considered to constitute legal advice.