

Guidance-Note on Periodic Inspection and Testing of Electrical Installations required by the 2007 Safety Health and Welfare at Work (General Application) Regulations

Introduction.

Electrical installations, if not properly maintained, can kill, injure and cause serious property damage. In Ireland, people are killed almost every year from contact with, or as a result of electricity. This Guidance-Note aims to assist employers, employees and others put in place a suitable regime for periodic inspection and testing of electrical installations to reduce the possibility of harm arising from the electrical installation in a workplace.

What Aspects of the Electrical Installation are covered?

An installation could vary from a standard small 230 Volt single phase electrical wiring system with distribution boards, lighting and general services to, in certain instances, arrangements involving three-phase high-voltage switch-gear, transformers and associated parts of the electrical installation in a major industrial or commercial environment. Systems such as Fire Alarm, Emergency Lighting and Security Alarms have detailed requirements set out in Irish Standards IS 3217, IS 3218 and IS-EN 50131 respectively. These requirements should be adhered to and will not be covered further in this Guidance.

Generally the Guidance-Note focusses on wiring and associated features such as earthing and distribution boards. This guidance-note is not aimed at appliances, which take their supply via the electrical installation. Appliances generally come with their own specific manufacturers' instructions which should be adhered to.

Legislation.

The requirement for periodic inspection testing and reporting is set out in Regulation 89 of the 2007 Safety Health and Welfare at Work (General Application) Regulations (S.I. No 299 of 2007) as amended by the Safety, Health and Welfare at Work (General Application)(Amendment) Regulations 2007 (S.I. No. 732 of 2007)), which states that

“ an employer shall ensure that—

.....

(b) an existing electrical installation is tested by a competent person in an appropriate manner—

(i) from time to time where required having regard to the nature, location and use of the installation,”

and that

“(d) all defects found during the testing and inspection of an electrical installation are rectified promptly so as to prevent danger.

.....

and a report of the test is completed by the competent person carrying out the test,”

Other regulations made under the 1972 Dangerous Substances Act (No. 10 of 1972) require inspection, testing and reporting on the electrical installation in

- retail and private petroleum stores at least every 3 years,
- petroleum bulk stores at least every 12 months and
- oil jetties at least every 15 months.

Visual Inspection.

A regular visual inspection should be carried out in all electrical installations. A visual inspection of this type does not necessarily need to be carried out by an electrician, but it should reveal any areas which are obviously in need of attention.

A visual inspection should look for:

- breakages
- wear & deterioration
- signs of over heating
- missing parts (covers, screws) and
- loose fixings

and confirm

- switchgear accessibility (no obstructions) and
- doors of enclosures are secure

It should also check the operation of

- equipment – switch on & off where equipment is not in regular use or where it is left off or on standby for long periods and
- residual current devices using test button.(It is recommended that, independent of any other inspection and test regime, residual current devices undergo a push-button test at least twice per year to ensure that they operate correctly when needed).

These routine checks need not to be carried out by an electrically skilled person but should be done by someone who is able to safely use the installation and recognise any obvious defects.

Time Intervals between Periodic Inspection & Testing.

With the exception of the specific time-frames outlined in the regulations made under the Dangerous Substances Act, the legislation doesn't prescribe time periods between full electrical inspection and testing. It does direct that electrical installations should be inspected and tested "**from time to time where required having regard to the nature, location and use of the installation**". The question arises as to if and when periodic inspection and testing is appropriate and what are the maximum intervals that should elapse between periodic inspection and testing. Section 62.4 of the "National rules for Electrical Installations" 2008, published by the Electro Technical Council of Ireland (ETCI) states that "**the frequency of periodic inspection and testing shall be determined by the type of installation, its use, the frequency of maintenance and the external influences to which it is subjected**".

The time between periodic inspection and testing of installations should be based on a risk assessment with the intervals dependant on a number of parameters such as the

- age of the installation,
- quality of the installation,
- environmental circumstances,
- type of persons using the installation,
- amount of supervision of the person responsible for the installation,
- guidance of the manufacturer,
- frequency of use,
- knowledge of the user and
- possibility of damage to the equipment

The table below sets out suggested intervals between periodic inspection and testing. In certain instances, for example where large numbers of people are not expected to be present and the risk of damage is low, these intervals may not be applicable for a number of years after initial connection if

- the installation has been certified following construction,
- the owner of the installation is in possession of the original cert and
- the installation has not deteriorated significantly since construction.

Type of Workplace	Suggested Period between Visual Check	Suggested Period between Inspection & Testing
Commercial	1 year	5 years
Educational establishments	1 year	5 years
Hospitals	1 year	5 years
Industrial	1 year	3 years
Residential accommodation	1 year	5 years
Offices	1 year	5 years
Shops	1 year	5 years
Laboratories	1 year	5 years
Agricultural / Horticultural	1 year	3 years
Cinemas	1 year	3 year
Leisure complexes(excluding swimming pools)	1 year	3 years
Restaurants / Hotels	1 year	5 years
Theatres	1 year	3 years
Public houses / Bars	1 year	5 years
Marinas	4 months	1 year
Laundrettes	1 year	1 year
Petrol stations	1 year	3 years
Construction sites	3 Months	6 Months

In the case of an installation under an effective management system for preventative maintenance, periodic inspecting and testing may be replaced by an adequate regime of continuous monitoring and maintenance of the installation and all its constituent equipment by skilled personnel. Adequate records of this maintenance regime must be maintained.

Types of Inspection and Testing to be done during formal Inspection & Testing.

The following non-exhaustive list indicates the types of inspection and tests that are necessary to complete the periodic inspection and testing of an installation.

- General appraisal of the installation by a competent person to assess the physical condition of the installation and its suitability for its environment.
- Continuity of the protective conductors and of the main supplementary equipotential bonding.
- Continuity of conductors in ring final circuits.
- Resistance of protective conductor.
- Insulation resistance of the electrical installation.
- Polarity.
- Fault Loop Impedance test.
- Verification of Operation of RCDs including the tripping times of all RCDs.

These tests are set out in more detail in chapter 62 of the ETCI National Rules for Electrical Installations.

It could also include other tests depending on the nature of the installation.

These additional tests might include

- thermal imaging,
- ultrasound scans and
- other tests as dictated by the installation.

The maintenance of equipment, particularly safety devices, according to manufacturers' instructions, must also be ensured.

Reports & Repair of Defects.

The results of the inspection & testing must be documented and signed. In practice reports are usually provided using official numbered Electro Technical Council of Ireland (ETCI) reports as shown in Appendix 62A of the ETCI's 2008 National Rules for Electrical Installations. This format is suitable for most installation and gives a standard format for recording periodic test and certification. A more detailed format may be required for special locations such as installations in potentially explosive atmospheres or installations containing high voltage (greater than 1000 Volts) elements.

An explosive atmosphere means a mixture with air of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture. Such combustion often leads to an explosion which can have devastating consequences. Petrol stations, bakeries and grain silos are some of the many sites, which can contain potentially explosive atmospheres. Locations such as these require special precautions due to the potential of ignition of a dust or gas cloud by an electrical spark.

Electrical Installation Condition Reports for permanent installations should be retained for at least ten years and should be made available by the client to any contractor who carries out the inspection and test in the future. All defects noted must be repaired promptly in order to prevent danger. Where a defect or an imminent threat to the person or building is identified, it should be rectified immediately by a qualified electrician. Such rectification works should be recorded and form part of a new certificate and a report of the test should be completed by the competent person carrying out the test.

Competence of Testers.

A person must be competent to safely undertake periodic inspection and testing. A person is deemed to be a competent person where, having regard to the task he or she is required to perform and taking account of the size or hazards (or both of them) of the undertaking or establishment in which he or she undertakes work, the person possesses sufficient training, experience and knowledge appropriate to the nature of the work to be undertaken. Those performing the inspection and testing must also be able to evaluate the test data and make informed decisions on the continued operation, deterioration or non-serviceability of the electrical installation. Different types of installation may require different levels of competencies. An industrial installation, one where an explosive atmosphere may occur will have different hazards to a standard office installation. A qualified electrician should have many of the competencies required to inspect and test a standard 230Volt/400 Volt installations. However, maintaining that competency will require continually keeping professional skills current. This may be achieved by undertaking continued professional development to maintain familiarity with developing knowledge within the industry. Work on more specialist installations containing explosive atmospheres or high voltage equipment will require additional training, knowledge and experience than would generally be available through a standard electrician's apprenticeship

Voltages in excess of 1000Volts.

In practice most installations will be nominally rated at 230 volts single-phase and 400 Volts three-phase. This Guidance-Note is primarily aimed at these installations. However, for certain installations, there may be transformers, switchgear and other equipment which will have voltages in excess of 1000 Volts. These higher voltage elements of installations must also be checked and tested periodically. The employer, where this higher voltage equipment is located, should do an assessment, in conjunction with a competent person, to set up a schedule inspection and testing of electrical equipment. This schedule should be maintained and available as part of the overall safety statement kept by the employer in accordance with the requirements of Section 20 of the Safety Health and Welfare at Work Act.

Bibliography

S.I. No. 299/2007 Safety Health and Welfare at work (General Application) Regulations.

S.I. No. 311/1979: DANGEROUS SUBSTANCES (RETAIL AND PRIVATE PETROLEUM STORES) REGULATIONS, 1979.

S.I. No. 313/1979: DANGEROUS SUBSTANCES (PETROLEUM BULK STORES) REGULATIONS, 1979.

S.I. No. 312/1979: DANGEROUS SUBSTANCES (OIL JETTIES) REGULATIONS, 1979.

Energy (Miscellaneous Provisions) Act 2006 (Number 40 of 2006)

Commission for Energy Regulation documents, “Electrical Safety Supervision Criteria Document Version 2.0 cer13098 - Consolidated Criteria Document” and “Modifications to Criteria Document cer13099a - Consolidated modifications to Criteria”

Electro Technical Council of Ireland (ETCI) National Rules for Electrical Installations (ET 101 2008)

Electro Technical Council of Ireland (ETCI) National Rules for Electrical Installations in Potentially Explosive Atmospheres (ET 105 2011)

The Institution of Engineering and Technology (www.theiet.org) ;- Code of Practice for In-service Inspection and Testing of Electrical Equipment (4th Edition).