Document Aim:

The aim of this Practitioner Guide (PG) is to provide procedural guidance to personnel involved in the inspection, testing and certification of fixed low voltage (LV) electrical installations on the Ministry of Defence (MOD) property.

Document Synopsis:

This document provides procedural guidance on the inspection, testing and certification of fixed LV electrical installations on the MOD property. It is not a technical guide on the practical aspects of inspection, testing and certification of such installations, which is left to the professional skills and judgement of the competent person undertaking the work.

The "Practitioners" to whom this Guide relates are Defence Estates (DE) personnel and other individuals or organisations who, on behalf of DE, have interest in the maintenance of electrical installations on the MOD estate.

It is hoped that this PG will provide guidance for Practitioners to ensure consistency of approach to inspection, testing and certification of LV installations, particularly in areas such as:

- Planned approach to periodic inspections
- Frequencies for periodic inspections based on type of installation
- The approach to inspection of installations in dwellings
- The use of correct codes for observations and recommendations in periodic inspection reports (PIRs)
- Timely remedial action following receipt of PIRs
- The need to maintain correct documentation.
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Date of Issue: 24 Sep 09

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Who should read this: Property Managers, Establishment Works Consultants, Works Services Managers, Private Finance Initiative Contractors, Regional Prime Contractors, Stand Alone Prime Contractors, Specialist Principal Support Providers, DE Specialist Term Consultants and Site Estate Authority Teams

When it takes effect: Immediately
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Equality And Diversity Impact Assessment

This policy has been Equality and Diversity Impact Assessed in accordance with the Department’s Equality and Diversity Impact Assessment Tool against:

Part 1 Assessment Only (no diversity impact found).

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<table>
<thead>
<tr>
<th>Date Issued</th>
<th>Version</th>
<th>Author</th>
<th>Reason for Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Related Documents

JSP 375 MOD H&S Handbook Volume 3   DE Specification 034 Electrical Installations
JSP 482 MOD Explosive Regulations   PG 03/09 LV Electrical Installations
ESTC Standard No 6 Part 1 - Electrical
Contents

Document Aim
Document Synopsis
Document Information
Document Control

Introduction
  • Aim
  • Scope

Statutory Regulations

Status of BS 7671

Safety

Application of the Guide Elsewhere
  USVF Bases
  Overseas Estates
  Deployed Operating Bases

Inspection and Testing
  Introduction
  Initial Verification
  Routine Checks
  Periodic Inspection and Testing
  Sample Sizes
  Inspection Deferrals
  • Figure 1: Sample Deferral Certificate

Installations in Poor Condition

Continuously Supervised Installations

Frequency of Inspection and Testing
  General
  Existing DE Contracts
  Routine User Checks
  Periodic Inspection Reporting
  • Table 1: Recommended Initial Frequencies for Inspection of Electrical Installations

Commercial Premises Let to Tenants

Domestic Installations
  Preamble
  Service Families Accommodation - Fixed Installations
  Other Dwellings - Fixed Installations
  Fixed Electrical Appliances and Accessories in Dwellings
  • Table 2: Inspection and Testing Frequencies for Fixed Electrical Appliances

In-service Inspection and Testing of Electrical Equipment
  Types of Electrical Equipment
  Frequency of In-service Inspection and Testing
  Categories of In-service Inspection and Testing
Competence of Electricians 11.0

Competence of Contractors 12.0
- Table 3: Approved Self-Certification Bodies Table 3

MOD Policy 13.0

400 Hertz Installations 14.0

Conduct of the Inspection and Testing 15.0
- Visual Inspection 15.1
- Testing 15.2
- Table 4: Testing at Initial Verification and Periodic Inspection Table 4

Hazardous Locations 16.0
- Introduction 16.1
- Definition of Electrical Tests in Hazardous Areas 16.2
- Explosive Storage Areas 16.3
- Fuel Storage and Dispensing Facilities 16.4
- Skilled Persons for Hazardous Areas Work 16.5
- Training Providers 16.6
- Table 5: Sira and CompEX Training Modules Table 5

Observations and Recommendations 17.0

Remedial Action 18.0

Certification 19.0
- Table 6: Type of Work and Certification Form Table 6

Typical Specifications for Periodic Inspection and Testing 20.0

Annexes
- Annex A – Examples of Categorisation A1 – A4
- Annex B – Typical Specifications for Periodic Inspection and Testing B1 – B11
- Annex C – Definitions C1 – C2
- Annex D – Further References D1
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP(E)</td>
<td>Authorised Person (Electrical)</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard</td>
</tr>
<tr>
<td>BS 7671</td>
<td>BS7671:2008 Requirements for Electrical Installations (IEE Wiring Regulations) as amended</td>
</tr>
<tr>
<td>BS EN</td>
<td>British Standard European Norm</td>
</tr>
<tr>
<td>CDM</td>
<td>Construction (Design and Management) Regulations 2007</td>
</tr>
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<td>Competent Person</td>
</tr>
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<td>DE</td>
<td>Defence Estates</td>
</tr>
<tr>
<td>DNO</td>
<td>Distribution Network Operator</td>
</tr>
<tr>
<td>EAL</td>
<td>EMTA Awards Limited</td>
</tr>
<tr>
<td>EAWR</td>
<td>Electricity at Work Regulations 1989</td>
</tr>
<tr>
<td>ECA</td>
<td>Electrical Contractors’ Association</td>
</tr>
<tr>
<td>ECS</td>
<td>Electrotechnical Certification Scheme</td>
</tr>
<tr>
<td>EFLI</td>
<td>Earth Fault Loop Impedance</td>
</tr>
<tr>
<td>EIC</td>
<td>Electrical Installation Certificate</td>
</tr>
<tr>
<td>ESC</td>
<td>Electricity Safety Council</td>
</tr>
<tr>
<td>ESTC</td>
<td>Explosives Safety Transport Committee</td>
</tr>
<tr>
<td>ESQCR</td>
<td>Electricity Safety, Quality and Continuity Regulations 2002</td>
</tr>
<tr>
<td>GN3</td>
<td>Guidance Note 3 to BS 7671:2008 Inspection and Testing</td>
</tr>
<tr>
<td>Hz</td>
<td>Hertz</td>
</tr>
<tr>
<td>HoE</td>
<td>Head of Establishment</td>
</tr>
<tr>
<td>HMO</td>
<td>Houses in Multiple Occupancy</td>
</tr>
<tr>
<td>HSG</td>
<td>Health and Safety Guidance</td>
</tr>
<tr>
<td>HSE</td>
<td>Health and Safety Executive</td>
</tr>
<tr>
<td>IEE</td>
<td>The Institute of Electrical Engineers</td>
</tr>
<tr>
<td>IET</td>
<td>Institution of Engineering and Technology</td>
</tr>
<tr>
<td>JIB</td>
<td>Joint Industry Board</td>
</tr>
<tr>
<td>JSP</td>
<td>Joint Service Publication</td>
</tr>
<tr>
<td>LMS</td>
<td>Land Management System</td>
</tr>
<tr>
<td>LV</td>
<td>Low Voltage</td>
</tr>
<tr>
<td>MMO</td>
<td>Maintenance Management Organisation</td>
</tr>
<tr>
<td>MOD</td>
<td>Ministry of Defence</td>
</tr>
<tr>
<td>PAT</td>
<td>Portable Appliance Testing</td>
</tr>
<tr>
<td>PELV</td>
<td>Protective Extra-Low Voltage</td>
</tr>
<tr>
<td>PG</td>
<td>Practitioner Guide</td>
</tr>
<tr>
<td>PIR</td>
<td>Periodic Inspection Report</td>
</tr>
<tr>
<td>RCD</td>
<td>Residual Current Device</td>
</tr>
<tr>
<td>SLA</td>
<td>Single Living Accommodation</td>
</tr>
<tr>
<td>SELV</td>
<td>Separated Extra-Low Voltage</td>
</tr>
<tr>
<td>USVF</td>
<td>United States Visiting Forces</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

1.1 Aim

The aim of this Practitioner Guide (PG) is to provide procedural guidance to personnel involved in the inspection, testing and certification of fixed LV electrical installations on the MOD property. It is not a technical guide on the practical aspects of inspection, testing and certification of such installations, which is left to the professional skills and judgement of the competent person undertaking the work.

1.2 Scope

The range and diversity of LV electrical installations found on MOD sites demand particular experience and skills of the Competent Person\(^1\), hereafter referred to as the Inspector, responsible for the certification of new installations and periodic inspection reporting of existing ones. Currently, the extent of inspection and testing undertaken on the MOD estate, and the quality of documentation maintained, vary widely from site to site and from one Maintenance Management Organisation (MMO) to another. This PG attempts to introduce a degree of standardisation and consistency to this important aspect of preventive maintenance programme.

This PG is to be regarded as supplementary to the IEE Wiring Regulations BS 7671: Requirements for Electrical Installations (as amended) and the latter shall always take precedence if information given in this PG conflicts with the requirements of BS 7671, and its associated guidance notes. The practical methods to be adopted, and any equipment necessary, for testing of installations are not detailed in this PG. Where this is required, guidance should be sought from IEE Guidance Note 3 on Inspection and Testing (GN3) and IEE Publication ‘On Site Guide’.

As far as is reasonably practicable inspection and testing of electrical installations on the MOD property should follow good industry practice and adhere to the recommendations contained in BS 7671 (as amended), taking wider consideration of those statutory regulations applicable to electrical work.

2.0 STATUTORY REGULATIONS

The following statutory regulations apply to electrical work:

- Health and Safety at Work etc Act 1974.
- The Electricity at Work Regulations 1989 (EAWR) as amended.
- The Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR) as amended.
- The Building Act (Building Regulations Part ‘P’).
- Housing (Scotland) Act 2006.

Regulation 4(2) of the EAWR requires that: “As may be necessary to prevent danger, all systems shall be maintained so as to prevent, so far as is reasonably practical, such danger”

\(^1\) A person who possesses sufficient technical knowledge and experience for the nature of the electrical work undertaken, and is able at all times to prevent danger, and where appropriate injury, to themselves and others.
and Regulation 5 states that: “No electrical equipment shall be put into use where its strength and capability may be exceeded in such a way as may give rise to danger”.

Whilst there is no specific requirement in the EAWR to carry out maintenance activity there is a requirement for a system to be kept in a safe condition. The frequency and nature of the maintenance must be such as to prevent danger ‘so far as is reasonably practicable’. Regular inspection of electrical equipment, which includes the electrical installation, is an essential part of any preventive maintenance programme. The frequency of such inspections must be risk based.

3.0 STATUS OF BS 7671

Although BS 7671 itself is non-statutory, under the ESQCR failure to comply with the regulations places the Distribution Network Operator (DNO) in the position of not being compelled to supply, or continue to supply, electrical energy to the installation, and under Regulation 21 of the ESQCR compliance with BS 7671 is mandatory for all consumers’ installations operating a switched alternative to a distributor’s network. Furthermore, the regulations may be used in the court of law in evidence to claim compliance with a statutory requirement. Installations which conform to the standards laid down in BS7671 are regarded by the Health and Safety Executive (HSE) as likely to achieve conformity with the relevant parts of the EAWR.

“Regulations” and BS 7671 are used interchangeably throughout this PG. Where a Regulation number is quoted it refers specifically to the Regulation number in BS 7671:2008, i.e. the 17th Edition of the IEE Wiring Regulations.

It is implicit in Regulation 341.1 of BS 7671:2008 that systems are required to be maintained and kept in a safe condition.

4.0 SAFETY

Inspection and testing is to be carried out in a manner that will ensure the safety of both the Inspector and that of others. Except for certain polarity tests, loop impedance, prospective fault current and RCD tests the electrical installation must be securely isolated and proven dead before testing is commenced. Where applicable, safety arrangements are to comply with the requirements of JSP 375, Volume 3 Chapter 3 (formerly Safety Rules and Procedures 01 - Electricity).

For those facilities where the JSP does not apply, such as on the Director Operations Housing (D Ops Housing) and Naval estates, guidance on safe isolation procedures for low voltage installations can be found in the Electrical Safety Council’s Best Practice Guide No. 2 which can be accessed via the link below:


Approved test instruments shall be used and precautions given in the HSE Guidance Note GS38 (revised) “Electrical Test Equipment for use by Electricians” should be observed. HSR25 EAWR Memorandum of Guidance on the Electricity at Work Regulations 1989 provides guidance on live and dead working. With the exception of the tests mentioned in the above paragraph live working cannot normally be justified on the MOD estate.

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2 Regulation 25 of the Electricity Safety, Quality and Continuity Regulations 2002
Where JSP 375 is applicable the first point of contact for the Inspector at site level will be the Authorised Person (Electrical) (AP(E)) who will need to be satisfied with the Inspector's competency as well as his/her familiarity with MOD safety rules and procedures as detailed in JSP 375 Volume 3 before allowing him/her to undertake the work. For those facilities where JSP 375 does not apply the Inspector will need to comply with any local rules in place.

5.0 APPLICATION OF THE GUIDE ELSEWHERE

5.1 USVF Bases

The guidelines given in this PG is applicable to the full range of LV electrical installations found on MOD Establishments occupied by the United States Visiting Forces (USVF). Both in terms of quality and safety the standard of electrical work undertaken on USVF sites should not be, in any respect, inferior to those executed on the UK MOD sites.

5.2 Overseas Estates

On the DE managed overseas estates design and maintenance of the electrical installations, selection of contractors and the appointment of skilled persons for the inspection and testing should comply with local regulations unless specifically required by the Secretary of State for Defence to comply with UK regulations. UK standards are normally enforced on overseas estates only when local regulations are not at least as stringent as UK standards, for example on the remote overseas estates. Where JSP 375 Volume 3 applies the skilled person is appointed accordingly.

The estates occupied by British Forces (Germany) (BF(G)) apply their own local (German) regulations. The competency of the contractor is established prior to contract let and local procedures apply to the selection and appointment of the competent person. For this reason, while the general principles mentioned in this PG may be applicable, the document will be of limited use to BF(G) staff.

5.3 Deployed Operating Bases

Where operational conditions permit the application of peacetime regulations the guidance given in this PG is to be followed on semi-permanent and permanent deployed operating bases so far as reasonably practicable. The guide is not applicable for installations designed and executed by the Royal Engineers in an operational theatre designated as a Military Works Area3.

6.0 INSPECTION AND TESTING

6.1 Introduction

In order to confirm that electrical systems are in a safe condition regular inspection and testing is necessary. There are three types of Inspection and Testing:

- Initial Verification.
- Routine User Checks.
- Periodic Inspection and Testing.

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3 Infrastructure Management on Joint Operations: Joint Warfare Publication 4-05.
6.2 Initial Verification

Initial Verification is to be completed for any new work and alterations and additions. The purpose being to ensure that the equipment and accessories are to a relevant standard, the installation complies with BS7671 and that it is safe. The responsibility for comparing inspection and test results with relevant criteria\(^4\) lies with the Inspector.

The inspector should begin by carrying out a thorough visual inspection of the installation and recording his/her findings on suitable schedules progressively throughout the different stages of erection and before the installation is certified and put into service. Where appropriate, testing should also take place and recorded. For full details of inspection and testing to be undertaken the Inspector should refer to GN3, although other methods are not excluded provided they give valid results. Although not exhaustive, the inspection list provided in GN3 is comprehensive and the initial tests prescribed therein must be carried out in a set sequence.

The Inspector must understand the relevant criteria for the particular inspection or test. Where the designer has specified requirements particular to the installation, which may be different from those in BS 7671 then the Inspector should obtain the design criteria at the outset, or forward the test results to the designer for verification with the intended design. In the absence of such data the requirements of BS 7671 should be applied.

The information required by Regulation 610.2 shall be made available to the Inspector, which includes the assessment of general characteristics and associated diagrams, charts and tables.

6.3 Routine User Checks

Routine user checks are normally carried out by an Ordinary Person\(^5\) who is able to use the installation safely and recognise defects. These checks supplement the normal reporting of wear and tear from users of the premises and are to be undertaken by someone appointed from within the user group. Routine user checks are therefore normally outside the scope of DE/ MMO responsibility, unless the property is primarily occupied by DE or the MMO and the responsibility for these checks are assigned to them.

6.4 Periodic Inspection and Testing

Periodic Inspection and Testing on existing installation will be undertaken to:

- Ensure the safety of persons and livestock against the effects of electric shock and burns in accordance with the general requirements of the regulations.
- Ensure protection against damage to property by fire and heat arising from an installation defect.
- Confirm the installation is not damaged or deteriorated so far as to impair safety.
- Identify installation defects and non-compliance with the requirements of the Regulations which may give rise to danger.

6.5 Sample Sizes

As periodic inspection and testing is normally conducted when the installation is in use it is not always possible to cover 100% of the installation, making sampling necessary. The

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\(^4\) Relevant Criteria are, for most part, the requirements of the Regulations for the particular inspection or test.

\(^5\) Ordinary Person – a person who is neither a skilled person nor an instructed person.
sample size to be applied must be agreed with the person ordering the work and will depend on the following aspects of the installation:

- Size.
- Age.
- Complexity.
- Condition of records.
- Frequency of routine maintenance.

In all cases the extent and limitations of the inspection is to be agreed beforehand between the Inspector and the person ordering the work. However, where records of previous Periodic Inspection Reports (PIRs), Electrical Installation Certificate (EIC), plans, drawings and maintenance records exist, the following minimum inspection and testing is recommended:

- All final circuits – earth continuity.
- All final circuits - insulation resistance between live conductors and earth.
- All Class 1 equipment that can be touched readily – earth continuity.
- 10% of out of reach Class 1 equipment – earth continuity.
- 10% accessories, luminaires etc., taken at random.

If the 10% sampling prove satisfactory, and the inspector is satisfied with the condition of the installation, further testing of remaining circuits/equipment may be waived. However, if the samples prove unsatisfactory then further sample checks are to be carried out. If these further checks prove unsatisfactory then suitable arrangement is to be made to inspect and test 100% of the installation.

When sampling is being considered, samples selected must ensure that they are representative of the installation and that over a period of time the whole installation is covered. Selection of only those convenient items which have been previously inspected is not to be permitted. Where no records exist the sample size should be increased substantially or even cover 100% of the installation.

6.6 Inspection Deferrals

Where operational necessity prevents the isolation of the supply to permit any testing the Dutyholder is to obtain the agreement of the Head of Establishment (HoE) to defer the inspection and issue a locally produced Deferral Certificate (see sample at Figure 1) signed by the HoE, or his authorised representative, with reasons as to why testing has not been permitted on the due date.

The deferral process must involve the Inspector who must agree on the deferred date, which should be no later than 12 weeks from the originally planned date. The decision for the deferral must be based on suitable and sufficient risk assessment undertaken by the issuer of the Deferral Certificate. A copy of the risk assessment is to be attached to the Deferral Certificate.

When deferral has been agreed, a thorough visual inspection, accompanied by thermographic surveys if necessary (see GN3 Section 3.11 for further information), is to be undertaken by the Inspector. Any limitations on the inspection and testing must be clearly identified in the report. The Deferral Certificate is to be attached to the visual inspection report. The deferred period should not exceed the date recommended by the Inspector.

DEFERRAL CERTIFICATE

I ……………………………………… (Rank & Name of Head of Establishment or his authorised representative)
of ……………………………………… (Site name)

Authorise the deferral of the Periodic Electrical Inspection and Testing of Building/Facility
Name /No: …………………………… until ……………………… (Insert latest date by Inspector) due to
shut down not being possible for the following operational reasons:

Authority is hereby given for the Inspector to carry out a full visual inspection of the installation
only. I am fully aware of the risks imposed by a full inspection and testing of the electrical
installations for these premises not being completed at this time. The risk assessment in
connection with this Deferral Certificate is attached.

........................................ (Signature) ........................................ (Rank & Name) ........................................ (Date)

Figure 1: Sample Deferral Certificate.

6.7 Installations in Poor Condition

If, during the detailed inspection mentioned at Paragraph 11.1, the Inspector finds the
installation in such poor condition that immediate testing is deemed necessary then a full
inspection and testing is to be undertaken at the earliest opportunity as agreed between the
Dutyholder and the MMO. The agreement reached is to be formally documented and kept in
the facility folder. However, the agreed period for completion of the full inspection and
testing shall not exceed a maximum of 4 weeks from the time the unsatisfactory condition of
the installation is discovered. The testing programme is to be rearranged with the Dutyholder
to suit the establishment’s operational programme, which may be conducted over a number
of visits if necessary. No Deferral Certificate is required to be issued in this case.

6.8 Continuously Supervised Installations

There is the opportunity that, where an installation is under effective management system for
preventive maintenance in normal use, periodic inspection and testing may be replaced by
an adequate regime of continuous monitoring and maintenance of the installation by Skilled
Person7, competent in such work, with appropriate records being kept. The records of
electrical maintenance and testing may be kept on paper or computer, however, any results
of tests and evidence of maintenance must be available for scrutiny.

In order to provide further guidance on what may be classified as a Continuously Supervised
Installation the following paragraph from BS EN 60079-17:20038 is reproduced below:

The objective of continuous supervision is to enable the early detection of arising faults and
their subsequent repair. It makes use of existing skilled personnel who are in attendance at
the installation in the course of their normal work (e.g. erection work, alterations, inspections,
maintenance work, checking for faults, cleaning work, control operations, switching
operations, making terminal connections and disconnections, setting and adjustment work,
functional tests, measurements, etc.) who use their skill to detect faults and changes at an
early stage.

7 Skilled Person – a person with technical knowledge of or sufficient experience to enable him/her to
avoid the dangers that electricity may create.
8 BS EN 60079-17:2003 Electrical Apparatus for Explosive Gas Atmospheres – Part 17: Inspection
and Maintenance of Electrical Installations in Hazardous Areas (other than mines).
Such systems are not normally found on the MOD estate but where they do exist then the guidance given should be adopted.

7.0 FREQUENCY OF INSPECTION AND TESTING

7.1 General

Guidance on the initial frequencies for formal inspections of electrical installations as well as routine checks is given in GN3, Table 3.2. The recommended interval for the first inspection of the installation following initial verification is agreed between the designer, installer and other relevant parties (such as the MMO), and entered in the Electrical Installation Certificate (EIC) prior to issue. Subsequent inspection intervals are recommended by the Inspector, based on the recommendations in GN3 and taking into account the factors discussed under the sub-section Periodic Inspection Reporting (Paragraphs 17.0-17.1).

7.2 Existing DE Contracts

Policy Instruction Number 07/2005 details specific intervals for statutory and MOD mandatory tasks, which include electrical inspections, and these intervals should be adhered to where references have been made in existing contracts provided that the condition of the installation, as assessed by the Inspector, is deemed satisfactory at the time of the inspection. Where the Inspector recommends that the interval should be reduced and the inspection brought forward the MMO is required to comply accordingly.

7.3 Routine User Checks

GN3 recommends that routine user checks should be undertaken by somebody who is able to use the installation safely and recognise defects. These checks supplement the normal reporting of wear and tear from users of the premises and are to be undertaken by someone appointed as the Dutyholder from within the user group.

Responsibility for routine user checks therefore does not normally fall on DE/MMO unless where the property is predominantly occupied by DE or the MMO and the responsibility for these checks have been assigned to them.

7.4 Periodic Inspection Reporting

7.4.1 Determining Factors. The Regulations requires that the frequency of periodic inspection and testing of the installation must be determined taking into account the following factors:

- Type of installation and connected equipment.
- Use and operation of the installation.
- Frequency and quality of maintenance regime.
- The external influences to which the installation is subjected.

7.4.2 Recommended Frequencies. Table 1 summarises the recommended frequencies for initial inspection frequencies based on GN3 Table 3.2.

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<table>
<thead>
<tr>
<th>Type of Installation</th>
<th>Examples</th>
<th>Routine Check</th>
<th>Max Period between I&amp;T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
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<td>General Installations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>Service Families Accommodation (SFA) and Hiring in lieu of SFA</td>
<td>Reporting of normal wear and tear as necessary and functional test of RCDs using test button (quarterly).</td>
<td>Inspection and earth testing of socket circuits and RCD instrument tests only at change of occupancy. Combined inspection and test every 10 years</td>
</tr>
<tr>
<td>Houses in Multiple Occupancy HMO</td>
<td>Single Living Accommodation (SLA)</td>
<td>Change of occupancy / 1 year</td>
<td>Change of occupancy / 5 years</td>
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<td>1 year</td>
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<td>Garages, workshops, pump houses, plant rooms, hangars, battery charging facilities</td>
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<td>3 years</td>
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<td>Buildings Open to the Public</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Places Subject to Entertainment Licence</td>
<td>Cinemas, Leisure Complexes, Places of Public entertainment</td>
<td>1 year</td>
<td>3 years</td>
</tr>
<tr>
<td>Restaurants</td>
<td>Pay-as-you-dine facilities</td>
<td>1 year</td>
<td>5 years</td>
</tr>
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<td>HIVEs, Cadet Centres</td>
<td>1 year</td>
<td>5 years</td>
</tr>
<tr>
<td>Churches</td>
<td></td>
<td>1 year</td>
<td>5 years</td>
</tr>
<tr>
<td>Museums</td>
<td></td>
<td>1 year</td>
<td>5 years</td>
</tr>
<tr>
<td>MOD Offices</td>
<td></td>
<td>1 year</td>
<td>5 years</td>
</tr>
<tr>
<td>Special Installations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Swimming Pools</td>
<td></td>
<td>4 months</td>
<td>1 year</td>
</tr>
<tr>
<td>Caravan Parks</td>
<td></td>
<td>6 months</td>
<td>1 year</td>
</tr>
<tr>
<td>Lightning Protection</td>
<td>Where installed</td>
<td>-</td>
<td>11 months</td>
</tr>
<tr>
<td>Agricultural and Horticultural</td>
<td></td>
<td>1 year</td>
<td>3 years</td>
</tr>
<tr>
<td>Emergency Lighting</td>
<td></td>
<td>Daily/monthly</td>
<td>1 year</td>
</tr>
<tr>
<td>Fire Alarms</td>
<td></td>
<td>Daily/weekly/monthly</td>
<td>6 months (BS 5839-1:2002)</td>
</tr>
<tr>
<td>Laundrettes</td>
<td></td>
<td>1 year</td>
<td>1 year</td>
</tr>
</tbody>
</table>

10 A building or part of a building (flat) which is occupied by more than one household and where at least one of the households share or lacks access to basic amenities (cooking, toilet etc.) and occupation by the households is as their main residence and it is the sole residential use of the accommodation.

11 Although SLA is not strictly HMO for the purpose of electrical inspections it is to be treated as such.

12 See BS 5266: Part 1:2005 Code of Practice for the emergency lighting of premises other than cinemas and certain other specified premises used for entertainment.

<table>
<thead>
<tr>
<th>Type of Installation</th>
<th>Examples</th>
<th>Routine Check</th>
<th>Max Period between I&amp;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Street Lighting</td>
<td>As convenient</td>
<td>(c)</td>
<td>6 years</td>
</tr>
<tr>
<td>Hazardous Locations</td>
<td></td>
<td>(d)</td>
<td></td>
</tr>
<tr>
<td>Explosive Storage and Processing</td>
<td>All electrical installation, fixed appliances and earthing (including lightning) installation</td>
<td>Refer to JSP 482 &amp; ESTC Leaflet No. 6</td>
<td>Refer to JSP 482 &amp; ESTC Leaflet No. 6</td>
</tr>
<tr>
<td>and Processing Facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Transport Refuelling Facilities</td>
<td>Motor Transport Refuelling Installations (MTFI)</td>
<td>1 year</td>
<td>1 year</td>
</tr>
</tbody>
</table>

Table 1: Recommended Initial Frequencies for Inspection of Electrical Installations.

8.0 COMMERCIAL PREMISES LET TO TENANTS

Many commercial leases pass both repairing responsibility and the responsibility of compliance with regulations and with statute to the occupying tenant. As such electrical systems within demised areas may be the responsibility of the tenant. However the situation can be complex; MOD as landlord may have inherent liabilities under the Defective Premises Act 1972 for demised areas and retained responsibility for common or structural areas. MOD may also have retained a repairing responsibility which extends to electrical systems. Care should therefore be taken in such cases; firstly, to observe the reserved rights of entry under the lease and secondly, only to pursue those works which remain the landlord’s responsibility, where the duty and risk has not been transferred. Personnel involved in inspection, testing and certification are therefore urged to liaise with Land Management System (LMS) estate surveyors involved in the management of such properties to consider where the ambit of responsibility lies.

It is recommended that the submission of a satisfactory electrical inspection report by the landlord forms part of the tenancy agreement, regardless of where the responsibility for the subsequent safe upkeep of the electrical installation lies.

9.0 DOMESTIC INSTALLATIONS

9.1 Preamble

The Director Operations Housing (D Ops Housing) has in place maintenance regime for Service Families Accommodation (SFAs) and substitute accommodation, which include the inspection and testing of electrical installations and fixed equipment within the property at more frequent intervals than that recommended in the following paragraphs. However, it is not intended that changes to the existing contracts should be initiated as a result of this guidance, unless suitable and sufficient risk assessment indicate that there is clear benefit to do so.

9.2 Service Families Accommodation - Fixed Installations

For a domestic installation GN3 recommends that inspection and testing should be carried out at each change of occupancy and/or at 10 years maximum intervals. Occupants of SFAs can change as frequently as every one-and-half to 3 year intervals. However, experience shows that during occupancy of the SFA the fixed electrical installation normally sees no modification from the tenants and any defects are reported and rectified in timely manner.
through D Ops Housing’s existing prime contracts. It is therefore considered both cost-effective and acceptable for inspections to be conducted as follows:

- **At Change of Occupancy.** A thorough visual inspection accompanied by earth testing of socket circuits and instrument tests of RCDs.

- **At 10-yearly Intervals.** Combined inspection and testing.

Where the inspection regime detects a fall in the condition of the installation or the age of the installation is of concern then the testing should be brought forward if in the opinion of the Inspector this is justified. All remedial works identified as Code 1 (requires urgent attention) and Code 2 (requires improvement) must be undertaken as detailed below under Paragraph 35.0 (Remedial Action). The installation is not deemed to be “Satisfactory” if either Code 1 or Code 2 has been annotated in the Observations section of the PIR.

During the inspection at change of occupancy special attention is to be given to signs of overheating and burning at cable terminations. Meter tails and junction box terminations often come loose and create potential fire risks. The inherent problems with termination of aluminium conductors at meter tails are well documented and require regular checks to ensure that creepage has not adversely affected the tightness of the connections. Junction boxes should also be inspected for tightness of terminations and sockets outlets should be inspected for signs of overloading.

Any additions and alterations to the installation, which should be readily identifiable through physical appearance of the new installation or through talking to the outgoing occupants, should have record of certification. It is advisable therefore that the inspection is carried out before the departure of the occupants, as they can also point out on any concerns they may have had on the electrical installation during their tenancy.

### 9.3 Other Dwellings – Fixed Installations

In the case of Hirings, Lettings and Houses in Multiple Occupation (HMO) a landlord 14 is required to have had a PIR carried out at regular intervals. The intervals between reports will depend, amongst other things, on the age and use of the installation, and in some instances (in particular for HMOs) on the requirements of the local licensing authority. Periodic inspection carried out at intervals of no greater than 5 years or at change of occupancy will normally satisfy the requirement. However, the interval should take account of the maintenance regime in place if the responsibility does not lie with the MOD.

Although Single Living Accommodation (SLA) do not require local licensing authority approval such facilities are to be regarded as synonymous to an HMO and are to be inspected and tested at 5-yearly intervals or change of occupancy.

In every case a PIR is to be issued in accordance with the latest edition of BS 7671 to the buildings’ records custodian.

### 9.4 Fixed Electrical Appliances and Accessories in Dwellings

Low voltage electrical appliances supplied with a dwelling (this includes SFA) as part of an occupancy agreement are to be tested and confirmed as being safe for use upon change of occupancy 15 and in any event at intervals as Table 2. Records are to be kept by the buildings’ records custodian of all tests.

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14 The Landlord and Tenants Act 1985 (the Landlord could well be the MOD).
15 To comply with the Electrical Equipment (Safety) Regulations 1994.
### Table 2: Inspection and Testing Frequencies for Fixed Electrical Appliances.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Change of Occupancy</th>
<th>Combined Inspection &amp; Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immersion heaters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage radiators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric Cooker</td>
<td>Visual inspection and earth continuity check for Class 1 equipment</td>
<td>10 yearly</td>
</tr>
<tr>
<td>Extract Fans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instantaneous Showers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 1 luminaire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard-wired Smoke Detectors17</td>
<td>Functional test</td>
<td>Annually</td>
</tr>
<tr>
<td>RCDs</td>
<td>Functional &amp; Instrument test</td>
<td>10 yearly</td>
</tr>
<tr>
<td>Circuit-breakers, isolators and switching devices</td>
<td>Functional tests</td>
<td>10 yearly</td>
</tr>
</tbody>
</table>

10.0 **IN-SERVICE INSPECTION AND TESTING OF ELECTRICAL EQUIPMENT**

10.1 **Types of Electrical Equipment**

In addition to the fixed installation, testing of all electrical equipment in an installation should be carried out at regular intervals. The electrical equipment include various classes\(^{18}\) of equipment as follows:

- Portable equipment
- Movable equipment
- Stationary equipment
- Handheld-equipment
- Equipment that is plugged in
- Equipment connected by means of a flexible cord/cable to a fused/unfused connection unit or isolator
- Built-in appliances
- IT equipment
- Extension leads, RCD leads, multi-way adaptors, RCD adaptors
- Equipment with high protective conductor currents

10.2 **Frequency of In-service Inspection and Testing**

The inspection and testing intervals are influenced by the following factors:

- Environment in which the equipment is used – for example, equipment in an office environment suffer less damage than on a construction site.
- Behaviour of the users – timely reporting and remedial action of damages will avoid hazards.
- Construction of the equipment – Class I equipment depends on the integrity of the earthing connection for safety whereas Class II equipment does not.
- Equipment type – a handheld appliance is more likely to suffer damage than a fixed appliance.

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\(^{16}\) Earthed equipment.

\(^{17}\) Hard-wired smoke detectors only. Battery powered ones are occupant’s responsibility although occupants are also encouraged to operate hardwired ones on a regular basis.

\(^{18}\) Class I (earthed), Class II (double insulated) and Class III (Separated Extra Low Voltage).
The HSE Guidance on maintaining portable and transportable electrical equipment can be found in HSG 107: Maintaining Portable and Transportable Electrical Equipment. Furthermore, the IEE Code of Practice for In-service Inspection and Testing of Electrical Equipment 3rd Edition, as revised, provides detailed guidance on what is required to comply with applicable legislation, initial frequencies and practical details of the inspections and tests, and other useful information.

10.3 **Categories of In-service Inspection and Testing**

The three categories of in-service inspection and testing are referred to in the IEE Code of Practice:

- **User Check** – performed by the user before each use. Not required to be recorded unless fault is found.
- **Formal Visual Inspection** – performed by a competent person. Includes user checks and thorough checks to ascertain serviceability of the equipment. This inspection should be recorded.
- **Combined Inspection and Test** – performed by the test operative. Consists of an inspection, testing to ensure the equipment is in a safe condition and functional checks. This combined inspection and test should be recorded.

Freely downloadable IEE Forms are available from the IET website via the link below and these forms are recommended as a means of standardising such documents for use on the MOD estates:

[http://www.theiet.org/publishing/wiring-regulations/forms/index.cfm](http://www.theiet.org/publishing/wiring-regulations/forms/index.cfm)

11.0 **COMPETENCE OF ELECTRICIANS**

The industry recognised qualification for operatives carrying out electrical installation work is the NVQ level 3 in Electrotechnical Services (Installations – Building and Structures) with suitable underpinning knowledge, the Practical Performance Assessment test (Achievement Measurement 2 or AM2) may also have been taken. These qualifications meet the requirements for the issue of an Electrotechnical Certification Scheme (ECS) card issued by the Joint Industry Board (JIB). The ECS card provides evidence of an operatives qualifications, demonstration of their Health and Safety awareness, allows access to major construction sites and is a photo identification of the card holder.

If the operative is to carry out inspection and testing of electrical installations then they are expected to hold a testing qualification (either City & Guilds 2391 – Inspection, Testing and Certification or the EMTA Awards Limited (EAL) – Diploma in Inspection and Testing Electrotechnical Systems and Equipment).

It is also strongly recommended that the operative has an up to date qualification on BS 7671:2008 (from either the awarding bodies City & Guilds or EAL).

12.0 **COMPETENCE OF CONTRACTORS**

The following organisations register electrical contractors within the UK:

- The Electrical Contractors’ Association (ECA), for England, Wales and Northern Ireland, and SELECT, for Scotland, are the industry trade associations owned and run by their members. Members have met the requirements of the industry
recognised technical assessment, have proved themselves as businesses of good standing and have their work covered by a warrantee.

- The NICEIC is a certification body. Electrical contractors on their roll have met the requirements of the industry recognised technical assessment.

- In England, Wales and Northern Ireland there are a number of government approved Part P competent persons schemes that register businesses that carry out work in dwellings in scope to the Building Regulations. Contractors who are on a competent scheme register have been assessed by the scheme to have met minimum technical competences and are authorised to self-certificate to building control that their work meets the requirements of Part P of the Building Regulations. The government approved competent persons schemes in England and Wales are:
  - ELECSA
  - The NICEIC
  - NAPIT
  - BSI
  - BRE

Table 3, which is not exhaustive, lists the electrotechnical organisations mentioned above.

<table>
<thead>
<tr>
<th>Business</th>
<th>Contact</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Standards Institution (BSI)</td>
<td>Phone: 01442 278 577</td>
<td><a href="http://www.kitemarktoday.com">www.kitemarktoday.com</a></td>
</tr>
<tr>
<td>ELECSA Ltd</td>
<td>Phone: 0870 749 0080</td>
<td><a href="http://www.elecsa.org.uk">www.elecsa.org.uk</a></td>
</tr>
<tr>
<td>Electrical Contractors’ Association (ECA)</td>
<td>Phone: 0207 3123 4800</td>
<td><a href="http://www.eca.co.uk">www.eca.co.uk</a></td>
</tr>
<tr>
<td>Joint Industry Board (JIB)</td>
<td>Phone: 020 8302 0031</td>
<td><a href="http://www.jib.org.uk">www.jib.org.uk</a></td>
</tr>
<tr>
<td>NICEIC Group Ltd</td>
<td>Phone: 0870 013 0382</td>
<td><a href="http://www.niceic.com">www.niceic.com</a></td>
</tr>
<tr>
<td>NAPIT Registration Ltd</td>
<td>Phone: 0870 444 1392</td>
<td><a href="http://www.napit.org.uk">www.napit.org.uk</a></td>
</tr>
<tr>
<td>SELECT</td>
<td>Phone: 0131 445 5577</td>
<td><a href="http://www.select.org.uk">www.select.org.uk</a></td>
</tr>
</tbody>
</table>

Table 3: Approved Self-Certification Registration Bodies.

## 13.0 MOD POLICY

Within the MOD boundary there is no requirement for an individual or business to be registered with one of these schemes to undertake any electrical work. There is also no requirement to comply with Part P of the Building Regulations for electrical work to MOD dwellings within the boundary of an MOD establishment. Outside the boundary of MOD establishment, where the work is commissioned by or on behalf of the MOD, the requirements of Part P will apply to MOD dwellings. However, the Inspector must be approved by the MMO as having the necessary experience and competence to undertake such work. Where JSP 375 is applicable the MMO is required to appoint him/her as a Skilled Person\(^\text{19}\) in accordance with JSP 375 Volume 3 Chapter 3. It is recommended that the persons carrying out electrical installation work hold an appropriate ECS card issued by the JIB.

It should be noted that periodic inspection and reporting requires experience beyond that necessary for initial verification, with knowledge and technical expertise to competently carryout the testing process. In addition, he/she must be fully familiar with the type of electrical installation to be inspected. Where applicable, for proof of experience it will be sufficient for the employer of the Skilled Person to declare in writing that the concerned

\(^{19}\) Here the definition if the Skilled Person has different meaning from that given in BS 7671.
person has sufficient experience in the type of work in question and is competent to undertake such work.

14.0 400 Hertz Installations

On aircraft servicing platforms or within aircraft servicing facilities it is quite common to find 200 volts, 400 Hertz power supplies supplied by rotary frequency converters or, more recently, static frequency converters. The inspection and testing of this type of the fixed installation require inspectors with knowledge and experience of 400 Hz systems. The test equipment must also be suitable for the high frequency.

As the majority of electrical contractors neither possess the expertise nor the specialist instrument(s) to inspect and test 400 Hertz systems, care must be taken in the selection of suitable contractors for the job.

A word of caution: Inspection of previous PIRs on 400 Hertz fixed installations have revealed that such installations have been treated as normal 50 Hertz systems for the purpose of the inspection and testing by some contractors. In some instances the testing has been restricted to insulation tests and with the tests being carried out with normal 50 Hertz test instruments.

15.0 Conduct of the Inspection and Testing

15.1 Visual Inspection

Visual inspection is extremely important and it should always precede testing. The purpose of the visual inspection is to confirm the following aspects of the installation:

- Equipment complies with standards in accordance with the requirements of Regulation Group 511 in BS 7671:2008.
- Equipment is correctly selected and erected.
- Equipment is not damaged.
- Equipment has not deteriorated due to external influences.

A comprehensive inspection checklist is provided in GN3, although this is not exhaustive. Any deficiencies found on new installations, or alterations and additions must be made good at the initial verification stage and prior to handover. For an existing installation the deficiencies picked up during the periodic inspection are to be corrected by the MMO as detailed in the Remedial Action section below.

Some of the pertinent checks to be carried out during the inspection phase are as follows:

- Particular attention should be given to the correct labelling of circuit protective devices, switches and terminals.
- Each socket outlet and any fixed equipment connection outlet must be labelled to indicate the protective devices the circuits are fed from.
- Except for dwellings, where socket outlets in a discrete area / room or zone are supplied by more than one ring or radial circuit a warning label should be prominently displayed at the consumer unit / distribution board to this effect.
Except for dwellings, on newly planned installations socket-outlets or fused-spur outlets are not to be supplied from an adjacent room which is on a different circuit to the rest of the room where the socket-outlet or fused spur is to be installed. Where this situation is found on existing installations immediate action is to be taken to fix a suitable label adjacent to the socket-outlet or fused spur, identifying where the circuit may be isolated, until the circuit can be reconfigured. Although extension to ring or radial circuits to an adjoining room is permitted by the Regulations there is greater risk of confusion arising from such installations in a non-domestic situation when maintenance is to be undertaken.

15.2 Testing

Detailed guidance on inspection and testing is given in GN3: Inspection and Testing. The tests shown in Table 4, where relevant, including measurements where specified, are to be carried out on fixed low voltage electrical installations as required by BS 7671 during initial verification, or following alteration, addition, repair or modification, and periodic inspections:

<table>
<thead>
<tr>
<th>Tests</th>
<th>Initial Verification</th>
<th>PIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity of circuit protective conductors</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Continuity of protective bonding conductors</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Continuity of ring final circuit conductors</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Protection by SELV, PELV or by electrical separation</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Protection by barriers or enclosures provided during erection</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Insulation of non-conducting floors and walls</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Polarity</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Earth electrode resistance</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Protection by automatic disconnection of the supply</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Earth fault loop impedance</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Additional protection</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Prospective fault current (by enquiry or measurement)</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Phase sequence</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Functional testing operation of Circuit-breakers, isolators and switching devices</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Functional testing operation of RCDs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>Yes</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 4: Testing at Initial Verification and Periodic Testing.

16.0 HAZARDOUS LOCATIONS

16.1 Introduction

Whilst electrical installations in hazardous locations are in scope of BS 7671 the Regulations are supplemented by the requirements or recommendations of other British Standards, MOD Regulations or by the person ordering the work. Inspection and testing of installations in hazardous areas shall only be undertaken by suitably qualified and experienced inspectors with formal evidence of relevant experience and training. In order to satisfy the requirements of the various licensing authorities for explosive and petroleum installations MMOs are required to provide the appropriate electrical test certificates which comply with the lead references mentioned in the following paragraphs.

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20 May not be necessary if proper records of previous tests exist. Required if changes have been made to the ring final circuit.
16.2 Definition of Electrical Test in Hazardous Areas

The requirements for electrical testing are defined within BS EN 60079-17 and BS EN 61241-17 and the types of test are detailed below:-

- **Visual Inspection.** Inspection which identifies, without the use of access equipment or tools, those defects, such as missing bolts, damage to enclosures, broken external earth connections etc, which are apparent to the eye.

- **Close Inspection.** Inspection which encompasses those aspects covered by a visual inspection and, in addition, identifies those defects, such as loose bolts, which will be apparent only by the use of access equipment, for example steps (where necessary) and tools. Close Inspections do not normally require the enclosure to be opened, or the equipment to be de-energised.

- **Detailed Inspection.** Inspection which encompasses those aspects covered by closed inspection and, in addition identifies those defects such as loose termination, which will only be apparent by opening the enclosure and/or using, where necessary, tools and test equipment.

16.3 Explosive Storage Areas

The following references should be referred to for guidance on inspection and testing in explosive storage areas:

- Joint Services Publication 482 MOD Explosive Regulations Volume 1 and 2 (as amended)
- ESTC Standard No. 6 (as amended) Requirements for the Commissioning, Inspection, Testing and Maintenance of Works for Explosive facilities Part 1 – Electrical.
- BS EN 61241 Electrical Apparatus for Explosive Dust Atmospheres Part 17 Inspection & Maintenance of Electrical Installations.

16.4 Fuel Storage and Dispensing Facilities

The following references should be referred to for guidance on inspection and testing in fuel storage and dispensing areas:

- BS EN 60079 series, specifically BS EN 60079-17:2007 Electrical Apparatus for Explosive Gas Atmospheres – Part 17: Inspection and Maintenance of Electrical Installations in Hazardous Areas (other than mines).

16.5 Skilled Persons for Hazardous Areas Work

Assessment of the skilled persons for working in hazardous areas should take account of adequate training and familiarity with the types of installations that they will be working on. In addition, where applicable, the skilled persons will be required to demonstrate to the AP (Petroleum) that they have sufficient knowledge on how to operate Multi-gas Indicator and carry out continual monitoring, and are aware of the risk and hazards associated with petroleum products.
16.6 **Training Providers**

There are two recognised training organisations which provide the specialist training for those involved with electrical installations within hazardous areas (see Table 5):

- **Sira Test & Certification Ltd.** Based on Competence Professional Scheme comprising assessment of knowledge and practical experience. In order to obtain the Knowledge Certificate units 3 and 7 are mandatory, in addition either unit 1 or 13 is to be successfully completed. Unit 20 must have been completed by those undertaking electrical testing and inspection. Experience is assessed through personal experience log and if found sufficient and relevant, together with the Knowledge Certificate, will result in the award of the UKAS accredited Competence Certificate.

- **CompEx.** Based on CompEx Certificate of Core Competence. Comprising ten units covering a range of different types of installations and divided into installation modules and test and inspection modules. The award of the Core Competency Certificate is awarded to the practitioner who has successfully passed the underpinning knowledge (theory) and competency validation (practical) assessments.

<table>
<thead>
<tr>
<th>Sira</th>
<th>CompEx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 1, ATEX 100a Introduction guidance &amp; application</td>
<td>EX 01 Preparation &amp; installation of Ex ‘d’, Ex ‘e’, Ex ‘n’ and Ex’p’ systems</td>
</tr>
<tr>
<td>Unit 3 Properties of flammable materials &amp; ignition sources</td>
<td>EX 02. Inspection &amp; maintenance of Ex ‘d’, Ex ‘e’, Ex ‘n’ and Ex’p’ systems</td>
</tr>
<tr>
<td>Unit 7 Overview of all protection methods, apparatus grouping &amp; temperature classification</td>
<td>EX 03, Preparation &amp; installation of Ex ‘i’</td>
</tr>
<tr>
<td>Unit 13, Basic understanding of ATEX 137 &amp; DSEAR</td>
<td>EX 04, Inspection &amp; maintenance of Ex ‘i’</td>
</tr>
<tr>
<td>Unit 8, Increased safety Ex ‘e’ protection concept, installation &amp; inspection</td>
<td>EX 05, Preparation &amp; installation of apparatus protected by enclosure for use in the presence of combustible dust</td>
</tr>
<tr>
<td>Unit 9, Flameproof Ex ‘d’ protection concept, installation &amp; inspection</td>
<td>EX 06, Inspection &amp; maintenance of apparatus protected by enclosure for use in the presence of combustible dust</td>
</tr>
<tr>
<td>Unit 10, Intrinsic safety Ex ia/Ex ib protection concept, installation &amp; inspection</td>
<td>EX 07, Preparation, installation &amp; decommissioning of electrical installations at petrol filling stations</td>
</tr>
<tr>
<td>Unit 11 Pressure Ex ‘p’ protection concept, installation &amp; inspection</td>
<td>EX 08, Inspection, testing &amp; maintenance of electrical installations at petrol filling stations</td>
</tr>
<tr>
<td>Unit 12 Non incendive Ex ‘n’ protection concept, installation &amp; inspection</td>
<td>EX 09, Preparation &amp; installation of electrical installation within the water industry</td>
</tr>
<tr>
<td>Unit 17 Handling combustible dust and fibres</td>
<td>EX 10, Inspection &amp; maintenance of electrical installation within the water industry</td>
</tr>
<tr>
<td>Unit 20 Theory for inspection and maintenance BS EN 60079-17</td>
<td></td>
</tr>
<tr>
<td>Unit 22 Hazardous area installation</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Sira and CompEx Training Modules.

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17.0 OBSERVATIONS AND RECOMMENDATIONS

The Inspector is to inspect and test the installation in accordance with the current edition of the IEE Wiring Regulations. The most important part of the PIR is the observations and recommendations section, which identifies any dangers and remedial work required. The following coding is to be used:

- Code 1 – Requires urgent attention.
- Code 2 – Requires improvement.
- Code 3 – Requires further investigation.
- Code 4 – Does not comply with the current edition of BS 7671.

The installation is not deemed to be “Satisfactory” if either Code 1 or Code 2 has been given in the observations.

The Electrical Safety Council (ESC) Best Practice Guide 4 entitled Periodic Inspection Reporting – Recommendation Codes for Domestic and Similar Electrical Installations gives useful guidance on the subject. The examples of categorisation given at Annex A are taken primarily from this source. The ESC Guide can be freely downloaded via the link below:


18.0 REMEDIAL ACTION

Initial Verifications require all snags to be remedied prior to the issue of the EIC. For PIRs, the course for remedial action by the MMO will depend on the category of the recommendations:

- Code 1 tasks are to be undertaken by the MMO immediately. Code 1 tasks are to be reported to the MMO immediately by the Inspector on discovery of the defect and not delayed until the PIR is produced. If, for any reason, immediate rectification is not possible operational restriction is to be put into place by isolating the affected part of the installation in the off position (with padlock, where possible, and suitable sign displayed).

- Code 2 tasks are to be rectified as soon as possible and, in any case, no later than within four weeks of receiving the PIR, unless the installation in question is planned for major refurbishment in the immediate future when the outstanding work will be included as part of the overall works.

- Code 3 items require further investigation to resolve. These are to be undertaken at the next opportunity with the order of priority of work being determined by the MMO through completion of suitable and sufficient risk assessments.

- Code 4 items do not pose any danger but even so should be considered for improvement at the next opportunity.

MMO should have procedures in place for recommendation Codes 1 and 2 to be rectified without undue delay as the installation will not be deemed to be satisfactory until remedial action have been completed and retested for compliance.
19.0 **CERTIFICATION**

Following inspection and testing of the new or existing installation certification is to be provided in accordance with Table 6. The appropriate certificate/report is to be handed to the person ordering the work\(^{22}\) who is to retain it for the whole working life of the installation.

The certification must include the Schedule of Inspections and Schedule of Test Results.

<table>
<thead>
<tr>
<th>Type of Work Completed</th>
<th>Type of Form Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Installation or change to existing installation</td>
<td>Electrical Installation Certificate</td>
</tr>
<tr>
<td>New installation work that does not include the provision of new circuit</td>
<td>Electrical Installation Certificate or Minor Electrical</td>
</tr>
<tr>
<td></td>
<td>Installation Work Certificate</td>
</tr>
<tr>
<td>Alterations or additions</td>
<td>Electrical Installation Certificate</td>
</tr>
<tr>
<td>Alterations or additions that does not include the provision of a new circuit</td>
<td>Electrical Installation Certificate or Minor Electrical</td>
</tr>
<tr>
<td></td>
<td>Installation Work Certificate</td>
</tr>
<tr>
<td>Periodic Inspection and Testing</td>
<td>Period Inspection Report</td>
</tr>
<tr>
<td>Replacement of equipment such as accessories or luminaires, but not for the replacement</td>
<td>Minor Work Certificate</td>
</tr>
<tr>
<td>of distribution boards or similar items.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Type of Work and Certification Form.

20.0 **TYPICAL SPECIFICATIONS FOR INSPECTION AND TESTING**

A typical specification that can be adapted for use for a periodic inspection and testing contract on the MOD estates is at Annex B.

This specification is for guidance only and can be modified to suit local working practices, particularly in relation to Section 2.0 Electronic Recording of Circuit Details and Test Results, where MOD systems may preclude the operation of MS Access. In such cases original test results in ring binders may be the only practical option for maintaining records.

The availability of this sample specification does not in itself suggest that periodic inspections should be contracted out separately, although there may be value in doing so. The specification can also be used as a checklist for existing periodic inspection and testing contracts.

\(^{22}\) For initial verification “work” refers to the installation work (and not inspection and testing), whilst for PIR it refers to the inspection and testing.
Annex A - Examples of Categorisation

The following table is mainly derived from Electrical Safety Council’s Best Practice Guide Number 4 Issue 2a\textsuperscript{23}. It should be noted that the list is not exhaustive and many situations will be found which will call on the experience of the Inspector. Ultimately, it is the responsibility of the authorised Inspector to determine the recommended code to be allocated to each departure from the Regulations based on the risk posed by such departure. The installation is not deemed to be “Satisfactory” if either Code 1 or Code 2 has been given in the observations.

Although the recommended codes are for domestic and similar electrical installations i.e. for use of Ordinary Persons, the recommendations will apply equally to similar non-domestic installations. The ESC Best Practice Guide Number 4 can be downloaded from the following link:


<table>
<thead>
<tr>
<th>Code 1 Requires Urgent Attention</th>
<th>Code 2 Requires Improvement</th>
<th>Code 3 Requires Further Investigation</th>
<th>Code 4 Does Not Comply with BS 7671 (as amended)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blanking piece missing from consumer unit / distribution board</td>
<td>Discontinuous ring final circuit or cross-connected with another circuit</td>
<td>Unable to trace final circuits</td>
<td>Switch lines not identified as line conductor at terminations</td>
</tr>
<tr>
<td>Damaged or no barriers or enclosures to terminations</td>
<td>Separate protective devices in line and neutral conductors e.g. double fusing</td>
<td>Unable to access equipment or connections needing to be inspected that are known to exist</td>
<td>CPC or final circuit conductors in a consumer unit not arranged or marked</td>
</tr>
<tr>
<td>Live conductors with damaged or missing insulation</td>
<td>A public utility water pipe or gas or oil pipe being used as the means of earthing for the installation</td>
<td>Insulation resistance of $&lt; 1$ Megohm between live conductors connected together and earth, when measured at the consumer unit with all final circuits connected</td>
<td>Undersized main protective bonding conductors (subject to a minimum 6 mm\textsuperscript{2}) if there is no evidence of thermal damage</td>
</tr>
<tr>
<td>Damaged accessory</td>
<td>Absence of circuit protective conductor (CPC) for circuit supplying one or more items of Class 1 equipment (including lighting circuit)</td>
<td>Absence of main protective bonding connection to a lightning protection system conductor, where it is known by the inspector if it is required to protect against lightning side flashes</td>
<td>Absence of CPC in circuits having only Class II (or all insulated) luminaires and switches</td>
</tr>
<tr>
<td>Conductive parts that have become live as a result of a fault</td>
<td>Earthing conductor undersized</td>
<td>Protective conductor of a lighting circuit not (or incorrectly) terminated at the final circuit connection point to a Class II (or insulated) item of equipment, such as at switch mounting box or luminaire</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{23} Periodic Inspection Reporting – Recommendation Codes for Domestic and Similar Electrical Installations.
<table>
<thead>
<tr>
<th>Code 1 Requires Urgent Attention</th>
<th>Code 2 Requires Improvement</th>
<th>Code 3 Requires Further Investigation</th>
<th>Code 4 Does Not Comply with BS 7671 (as amended)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence of effective means of earthing</td>
<td>Absence of earthing at a socket outlet</td>
<td>Absence of “Safety Electrical Connection – Do Not Remove” notice</td>
<td></td>
</tr>
<tr>
<td>RCD or voltage operated ELCB on TT system fails to operate</td>
<td>Absence of main protective conductor</td>
<td>Absence of notice indicating that the installation has wiring colours of two versions of BS 7671</td>
<td></td>
</tr>
<tr>
<td>Evidence of excessive heat from electrical equipment causing damage to the installation or surroundings</td>
<td>Absence of fault protection by RCD</td>
<td>Absence of RCD periodic test notice</td>
<td></td>
</tr>
<tr>
<td>Incorrect polarity, or protective device in neutral conductor only</td>
<td>A borrowed neutral</td>
<td>Absence of circuit identification details</td>
<td></td>
</tr>
<tr>
<td>Circuits with incorrect over-current protection</td>
<td>Absence of a warning notice indicating second source of electricity</td>
<td>Sheath of an insulated and sheathed non-armoured cable not taken inside the enclosure of an accessory, such as at socket-outlet or lighting switch</td>
<td></td>
</tr>
<tr>
<td>Absence of RCD protection for socket outlets in bathrooms or shower rooms, other than SELV, or shaver socket-outlets</td>
<td>Fire risk from incorrectly installed electrical equipment</td>
<td>Bare protective conductor of an insulated and sheathed cable not sleeved with insulation, colour coded to indicate its function</td>
<td></td>
</tr>
<tr>
<td>Socket-outlets other than SELV or shaver socket-outlets located within 0.6 m horizontally from the boundary of zone 1 in a location containing a bath or shower</td>
<td>Undersized main protective conductors</td>
<td>Installation not divided into adequate number of circuits to minimize inconvenience for safe operation, fault clearance, inspection, testing and maintenance</td>
<td></td>
</tr>
<tr>
<td>Earth fault loop impedance too high to operate protective device within designed disconnection time</td>
<td>Unenclosed connections at luminaires</td>
<td>Inadequate number of socket outlets, requiring the use of extension leads and multi-socket adaptors</td>
<td></td>
</tr>
<tr>
<td>30 mA RCD fails to operate within designed parameters when tested at X5 (150 mA)</td>
<td>Immersion heater does not have thermal cut-out i.e. does not comply with BS EN 60335-2-73</td>
<td>Fixed equipment does not have a means of switching off for mechanical maintenance, where such maintenance involves a risk of burns, or injury from mechanical movement</td>
<td></td>
</tr>
</tbody>
</table>

24 SELV = Separated extra-low voltage
<table>
<thead>
<tr>
<th>Code 1 Requires Urgent Attention</th>
<th>Code 2 Requires Improvement</th>
<th>Code 3 Requires Further Investigation</th>
<th>Code 4 Does Not Comply with BS 7671 (as amended)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsatisfactory functional operation of equipment where this may result in danger</td>
<td>Absence of supplementary bonding to installed Class II equipment where required</td>
<td>Socket-outs other than SELV or shaver socket-outs located between 0.6m and 3m horizontally from the boundary of zone 1 in a location containing a bath or shower</td>
<td>Reliance of a voltage-operated earth-leakage circuit-breaker for fault protection, subject to the device being proved to operate correctly. If circuit breaker relies on a water pipe not permitted by Regulation 542.2.4 as means of earthing, this would attract Code 2 recommendation.</td>
</tr>
<tr>
<td>Absence of RCD protection for portable or mobile equipment for outdoor use</td>
<td>Absence of RCD protection for cables installed at depth of less than 50 mm from a surface of a wall or partition where the cables do not incorporate an earthed metallic covering, are not enclosed in earthed metalwork, or are not mechanically protected against penetration by nails and the like</td>
<td>Absence of RCD protection for socket-outlet circuits that are unlikely to supply portable or mobile equipment for use outdoors, or that are in a bathroom or shower room</td>
<td></td>
</tr>
<tr>
<td>High earth fault loop impedance</td>
<td>Absence of RCD protection for socket-outlet circuits that are unlikely to supply portable or mobile equipment for use outdoors, or that are in a bathroom or shower room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation deteriorated to such an extent that insulating material breaks away from the conductors</td>
<td>Main protective bonding to gas, water or other service pipe is inaccessible for inspection, testing and maintenance, or connection not made before any branch pipe-work (preferably within 600 mm of meter)</td>
<td>Absence of supplementary bonding</td>
<td>Use of unsheathed flex for lighting pendants</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code 1 Requires Urgent Attention</th>
<th>Code 2 Requires Improvement</th>
<th>Code 3 Requires Further Investigation</th>
<th>Code 4 Does Not Comply with BS 7671 (as amended)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single insulated (unsheathed) cables exposed to mechanical damage</td>
<td>Excessive voltage drop</td>
<td>Any one of the following labels missing: Periodic inspection &amp; test, RCD test, protective bonding / earthing, high protective conductor currents</td>
<td>Socket-outlet mounted such as to result in potential damage to socket, plug and/or flex</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No earth tail link between the earthing terminal of an insulated accessory and a metal back box</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Installation divided into too few circuits</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Green insulated conductor used as circuit protective conductor</td>
</tr>
</tbody>
</table>
PERIODIC INSPECTION & TESTING

OF THE FIXED WIRING INSTALLATION

(CLIENT NAME)

(LOCATION)

IN ACCORDANCE WITH ELECTRICITY AT WORK REGULATIONS 1989

&

BS7671: 2008 (as amended)

SPECIFICATION REFERENCE

(XXXX)

(TO BE QUOTED ON ALL CORRESPONDENCE)
1.0 SCOPE OF WORKS FOR PERIODIC INSPECTION AND TESTING TO BS7671:2008

Purpose

The purpose of periodic inspection and testing is to provide, so far as is reasonably practicable, for:

1. The safety of persons and livestock against the effects of electric shock and burns in accordance with the general requirements of Regulation 131.1, and
2. Protection against damage to property by fire and heat arising from an installation defect, and
3. Confirmation that the installation is not damaged or deteriorated so as to impair safety, and
4. The identification of installation defects and non-compliance with the requirements of the Regulations which may give rise to danger.

Standards

The inspection and test shall be carried out in accordance with the requirements of the following:

- Electricity at Work Regulations 1989.
- The Health and Safety at Work etc. Act 1974.

General Procedure

Where diagrams, charts or tables are not available, a degree of exploratory work may be necessary so that inspection and testing can be carried out safely and effectively. A survey may be necessary to identify switchgear, control gear and circuits they control. If no schematic diagrams exist for the installation the Inspector may be asked to produce them by the Client at extra cost.

During the inspection, the opportunity will be taken to identify dangers which might arise during the testing. Any location and equipment for which safety precautions may be necessary will be noted and the appropriate steps taken.

A careful check will be made of the type of equipment on site so that the necessary precautions can be taken, where conditions require, to disconnect or short-out electronic and other equipment which may be damaged by testing. Special care must be taken where control and protective devices contain electronic components.

Scope

The requirement of BS 7671 for periodic inspection and testing is for INSPECTION comprising a detailed examination of the installation without dismantling, or with partial dismantling as required, together with the tests of Chapter 61 considered appropriate by the person carrying out the inspection and testing. The scope of the periodic inspection and testing must be decided by a competent person, taking into account the availability of records and the use, condition and nature of the installation.

A thorough visual inspection will be made of all electrical equipment which is not concealed, and will include the accessible internal condition of a sample of the equipment as agreed with the person ordering the work. The external condition will be noted with regard to the following:
• safety
• wear and tear
• corrosion
• damage
• excessive loading (overloading)
• age
• external influences
• suitability

Where sections of an electrical installation are excluded from the scope of a Periodic Inspection and Test, they will be identified in the 'extent and limitations' box of the Report. However, such sections must not be permanently excluded from inspection and testing, and a suitable programme should be devised which includes the inspection and testing of such sections.

Isolation of Supplies

The requirement of Regulation 14 of the Electricity at Work Regulations 1989 regarding working on or near live parts must be observed during inspection of an installation.

Main switch panels can rarely be isolated from the supply for long periods; similarly, the disruption that may be caused by isolating final circuit distribution boards for long periods often cannot be tolerated.

Distribution boards will be isolated separately for short periods for the internal inspection of live parts and examination of connections.

Items to be Inspected

It is not practicable to inspect every joint and termination in an electrical installation. Nevertheless a sample inspection will be made. An inspection will be made of all accessible parts of the electrical installation, e.g. switchgear, distribution boards, and a sample of luminaire points and socket-outlets, to ensure that all terminal connections of the conductors are properly installed and secured. In all cases the extent and limitations of the inspection is to be agreed beforehand between the Inspector and the person ordering the work. However, where records of previous PIRs, Electrical Installation Certificate (EIC), plans, drawings and maintenance records exist, the following minimum inspection and testing is recommended:

- All final circuits – earth continuity and earth fault loop impedance (EFLI).
- All final circuits - insulation resistance between live conductors and earth.
- All Class 1 equipment that can be touched readily – earth continuity and EFLI.
- 10% of out of reach Class 1 equipment – earth continuity and EFLI.
- 10% accessories, luminaires etc., taken at random.

If the 10% sampling prove satisfactory, and the inspector is satisfied with the condition of the installation, further testing of remaining circuits/equipment may be waived. However, if the samples prove unsatisfactory then further sample checks are to be carried out. If these further checks prove unsatisfactory then suitable arrangement is to be made to inspect and test 100% of the installation.

When sampling is being considered, samples selected must ensure that they are representative of the installation and that over a period of time the whole installation is covered. Selection of only those convenient items which have been previously inspected is
not to be permitted. Where no records exist the sample size should be increased substantially or even cover 100% of the installation.

Generally, it is not appropriate to apply sampling to socket-outlets and items of Class I equipment, 100% EFLI and earth continuity shall apply.

The presence of fire barriers, seals and means of protection against thermal effects will be verified, if reasonably practicable.

Under the requirements of the 17th Edition, the protective measures of double or reinforced insulation may also be used to provide both basic and fault protection, in which case the requirements of section 412 must be met.

VISUAL INSPECTION

Basic Protection

It will be established that the means of basic protection preventing access to live conductors is provided by one or more of the following methods:

1. insulation of live parts
2. installation of barriers or enclosures
3. obstacles
4. placing out of reach
5. SELV or PELV

For each method for providing basic protection it will be established that there has been no deterioration or damage to insulation, no removal of barriers or obstacles and no alterations to enclosures or access to live conductors which would affect its effectiveness.

Fault Protection

The method of fault protection must be determined and recorded. For automatic disconnection of supply, the adequacy of main equipotential bonding and the connection of all protective conductors with the earth is essential.

Protective Devices

The Presence, accessibility, labelling and condition of devices for electrical protection, isolation and switching will be verified.

It will be established that each circuit is adequately protected with the correct type, size and rating of fuse or circuit-breaker. The suitability of each protective and monitoring device and its overload rating or setting will be checked.

The enclosure and mechanical protection of all electrical equipment will be inspected to ensure that they remain adequate for the type of protection intended.

Labelling

The labelling of each circuit will be verified.

It will be established that adjacent to every fuse or circuit-breaker there is a label correctly indicating the size and type of the fuse, nominal current of the circuit-breaker and identification of the protected circuit.

Notice or labels are required at the following points:
At the origin of every installation
Where different voltages are present
At earthing and bonding connections
Residual current devices (RCDs)
Caravan installations
Non-standard colours
Dual supply

External influences

Any known changes in external influences, building structure, and alterations or additions which may have affected the suitability of the wiring for its present load and method of installation should be noted.

TESTS TO BE PERFORMED

The tests considered appropriate by the person carrying out the inspection will be carried out in accordance with the recommendations in the table below (reproduced from GN3). Reference methods of testing are provided in Section 2.7 of Guidance Note 3 but alternative methods which give no less effective results may be used.

<table>
<thead>
<tr>
<th>Test</th>
<th>Recommendation</th>
</tr>
</thead>
</table>
| Protective conductors continuity | Between the earth terminal of distribution boards to the following exposed-conductive-parts:  
► socket-outlet earth connections  
► accessible exposed-conductive-parts of current-using equipment and accessories |
| Bonding conductors continuity | ► all protective bonding conductors  
► all necessary supplementary bonding conductors |
| Ring circuit continuity | Where there are proper records of previous tests, this may not be necessary. This test will be carried out where inspection/documentation indicates that there may have been changes made to the ring final circuit. |
| Insulation resistance | If tests are to be made  
► between live conductors, with line(s) and neutral connected together, and earth at all final distribution boards  
► at main and sub-main distribution panels, with final circuit distribution boards isolated from mains |
| Polarity | At the following positions:  
► origin of the installation  
► distribution boards  
► accessible socket-outlets  
► extremity of radial circuits |
| Earth electrode resistance | Test each earth rod or group of rods separately, with the test links removed, and with the installation isolated from the supply source. |
| Earth fault loop impedance | At the following positions:  
► origin of the installation  
► distribution boards  
► accessible socket-outlets  
► extremity of radial circuits |
### Functional tests

<table>
<thead>
<tr>
<th>RCDs</th>
<th>Tests as required by Regulation 612.13.1, followed by operation of the functional test button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit-breakers, isolators and switching devices</td>
<td>Manual operation to prove that the devices disconnect the supply.</td>
</tr>
</tbody>
</table>

---

**TESTING**

**General**

If an electrical installation is isolated from the supply, it is permissible to disconnect protective and equipotential bonding conductors from the main earthing terminal in order to verify their continuity.

Where an electrical installation cannot be isolated from the supply, the protective equipotential bonding conductors must **NOT** be disconnected.

For continuity testing a low current ohmmeter (200 mA short circuit current) is to be used.

When testing the effectiveness of main equipotential bonding conductors, the resistance value between a service pipe or other extraneous-conductive-part and the main earthing terminal should be of the order of **0.05 \( \Omega \)** or less.

Supplementary bonding conductors will similarly have a resistance of **0.05 \( \Omega \)** or less.

It will be confirmed that an exposed-conductive-parts including items of class I equipment such as metal switch plates and luminaries are connected to the earthing arrangements of the installation by a circuit protective conductor.

**Insulation Resistance Test**

Insulation resistance tests, where required, will be made on electrically isolated circuits with any electronic equipment which might be damaged by application of the test voltage disconnected or only a measurement to protective earth made, with the line and neutral connected together.

**Polarity Test**

It should be established whether there have been any alterations or additions to the installation since its last inspection and test. If there have been no alterations or additions then sample test will be made of at least 10 per cent of all single-pole and multi-pole control devices and of any centre-contact lamp holders, together with 100 per cent of socket-outlets.

**Earth Fault Loop Impedance (EFLI) Test**

EFLI test will be carried out at the locations indicated below:

- origin of the installation
- distribution boards
- accessible socket-outlets
- extremity of radial circuits

**Operation of Residual Current Devices**

Where there is RCD protection, the effective operation of each RCD must be verified by a test simulating an appropriate fault condition independent of any test facility incorporated in
the device, followed by operation of the integral test device.

**Operation of Overcurrent Circuit-Breakers – Functional Test**

Where protection against overcurrent is provided by circuit-breakers, the manual operating mechanism of each circuit-breaker will be operated to verify that the device opens and closes satisfactorily.

**Operation of Devices for Isolation and Switching – Functional Test**

Where means are provided in accordance with the requirements of the Regulations for isolation and switching, they will be operated to verify their effectiveness and checked to ensure adequate and correct labelling.

**PERIODIC INSPECTION REPORT**

BS 7671 requires that the results and extent of periodic inspection and testing shall be recorded on a Periodic Inspection Report and provided to the person ordering the inspection.

The report shall include:

- A description of the extent of the work, including the parts of the installation inspected and details of what the inspection and testing covered.
- Any limitations which may have been imposed during the inspection and testing of the installation.
- Details of any damage, deterioration, defects and dangerous conditions any non-compliance with BS 7671 which may give rise to danger.
- Schedule of inspections.
- Schedule of test results.

Any immediately dangerous condition will be reported in writing without delay to the employer or responsible employee via an Urgent Defect Report. It should preferably be rectified following instruction from the Client.

Installations including those constructed in accordance with earlier editions of BS 7671 will be inspected and tested for compliance with the current edition of BS 7671 and departures recorded.

Guidance on the action to be taken is to be given in the Observations and Recommendations section of the Periodic Inspection Report by attributing each observation (non compliance) Code 1 - 4.

If the Code 1 or Code 2 is allocated to an observation, indicating that it requires urgent attention or improvement, then the overall assessment must be that it is unsatisfactory. If Code 3 is allocated, the person carrying out the test will have to use judgement to determine whether or not the installation can be classed as satisfactory.

**Urgent Defects**

Notification on finding a dangerous electrical situation (Code 1) must be issued immediately to the Maintenance Management Organisation (MMO) or the nominated point of contact, with a reference in the completed report. A process map must be included in the Tender return to define the proposed process.
Report

A periodic inspection report summary is to be supplied in a 4-ring binder as a hard copy for each building detailing the Installation condition summary, test date, retest date due and quantity of defects by defect code. The full report is to be supplied in pdf format on CD-ROM in addition to the specific requirements defined in Section 2.0.

2.0 ELECTRONIC RECORDING OF CIRCUIT DETAILS AND TEST RESULTS

It is a condition of this Contract that the Client requires all information collected on site during the Periodic Inspection & Test programme regarding the Electrical Installation to be recorded electronically in a Microsoft Access Database. This will be updated and presented to the MMO as the Contract progresses following completion at defined milestones by the successful Contractor.

The Database shall allow the Client to search and print information relating to any aspect of the Electrical Installation tested. All Switchgear forming part of the Installation tested shall be issued with a unique Asset Number which shall be affixed to the switchgear in a prominent position. This will be in addition to the on site identification reference for the Switchgear. The Access Database shall allow for searching by Asset number, and by Building / Location. An Index shall be included showing details of each item of Switchgear and where it is fed from for each Installation / Building.

The Access Database shall allow for Circuit Schedules to be printed and a facility for exporting them into an editable Word document to enable the Client to update them following any future alterations / additions.

The Schematic drawings provided must be indexed to cross reference the Circuit Details and Test Results sheets to the Drawing for each Installation / Building.

All deviations from the Regulations noted must have a unique identification number within the Access Database which shall be used to cross reference any Minor Electrical Works Installation Certificates used for correcting the deviations found.

The successful Contractor will be required to demonstrate the operation of the Access Database prior to Contract Award.

In addition they will be required to detail the quality control procedure in place to ensure the accuracy of the Schematic Drawings produced compared to the Periodic Inspection & Test Report details contained within the Access Database.

3.0 ELECTRICAL RECORD DRAWINGS AND DOCUMENTS BY CONTRACTOR

It is a requirement for these works that Schematic Drawings are generated identifying the following:

- Description of origin of supply - Transformer / Intake details.
- Generator details (if applicable).
- Supply cable size, type & approximate length for each item of Switchgear.
- EFLI (Zdb) & PFC (kA) values for each item of Switchgear.
- Location of switchgear
- Type, no of ways/ phases and rating of each item of Switchgear
In addition to the above the following outgoing circuit details must be included on the drawings:

- Circuit Number
- Circuit Phase
- Circuit Phase Size (mm²)
- Circuit Overcurrent device BS No.
- Circuit Overcurrent device Rating
- Circuit Description

The Schematic drawing must be cross referenced to the report.

Provision of as fitted drawings detailing switchgear locations throughout the site, highlighting the position of the main Isolating switch position for each building. All drawings are to be printed A1 or A3, and to be supplied electronically on CD-ROM in .DWG or .DXF format.

It is important that the accuracy of the drawings is maintained and you are required to process map your quality control processes that ensures the accuracy of the drawings in your Tender return. Samples of Documentation, Drawings & Labels consistent with the above items above must be submitted with your Tender return for approval.

4.0 MINOR ELECTRICAL WORKS INSTALLATION CERTIFICATES

In the event that Minor Electrical Installation Works Certificates are required for remedial actions carried out at the request of the Client, the Minor Electrical Installation Works Certificates MUST be of the same format style as the Periodic Inspection Report. There must also be a clear cross-referencing system between these certificates to clearly identify the link between them.

5.0 TEMPORARY ELECTRICAL SUPPLIES

The bidder is to include within the rate calculation of his tender submission, ALL temporary electrical supplies which may be required to support essential and critical equipment as deemed necessary by the Client.

Normal business will NOT be suspended during the testing works, so it is essential for the welfare of staff that these temporary supplies are installed in non-intrusive routes generally fixed securely around room perimeters. Actual routes to be agreed with the Client before installation. Non-slip rubber protective guards are to be installed if crossing doorways cannot be avoided.

6.0 STANDARDS

The foregoing works will be undertaken in accordance with the following standards including but not limited to:

- Electricity at Work Regulations 1989.
- The Health & Safety at Work etc. Act 1974.
- HS (G) 85 Electricity at Work – Safe Working Practices.
- GS 38 Electrical Test Equipment for Use by Electricians.
• GS 27 Protection against Electric Shock.

6.1 COMPANY AND STAFF

Company

The testing company shall be a member of any one of the nationally recognized certification bodies. Additionally, they should be ISO 9002 and ISO 14001 accredited. For inspection and testing of installations in Domestic Dwellings the company must also be registered under a Competent Person Scheme.

Proof of membership must be submitted with tender documents.

Contract Manager

The Contract Manager shall be assessed, via the Electrotechnical Assessment Scheme (EAS), as competent to manage the inspection and testing of the given electrical installation and should additionally possess suitable experience in safety and management.

Further information on the EAS can be obtained via the link below:

http://www.theiet.org/publishing/wiring-regulations/eas/

Testing Staff

All testing staff will be full time employees of the company and shall be assessed via the EAS as competent to undertake inspection and testing of the given electrical installation.

All testing staff must be in possession of the correct PPE necessary for the work being undertaken.

Staff Identification

All staff shall be required to wear their company attire and possess photo-identification.

6.2 TEST EQUIPMENT

All testing equipment shall be constructed and designed to BS EN 61010 or equivalent.

Low Resistance Ohmeters: test current may be A.C. or D.C., from a source with no load voltage not less than 4V and greater than 24V, and with a short circuit current not less than 200mA.

Insulation Resistance Ohmeters: The instrument used should be capable of developing the test voltage required across the load. The instrument must be capable of supplying an output current of 1mA at its nominal voltage so that it can develop its nominal test voltage when applied to the minimum acceptable insulation resistance.

Earth Fault Loop Impedance Testers: The test duration must be within safe limits; this means in general that the instrument should cut off the test current after a maximum of 40 ms.
**RCD Testers**: Test current should be applied for no longer than 2 seconds. Maximum test durations should be accurate to 5% of the required duration.

Copies of current Calibration Certificates for all test equipment used will be required at the start of the contract and as the contract progresses.


### Annex C – Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Competent Person</strong></td>
<td>A person who possesses sufficient technical knowledge and experience for the nature of the electrical work undertaken, and is able at all times to prevent danger, and where appropriate injury, to themselves and others. (A Dutyholder may or may not be a competent person)</td>
</tr>
<tr>
<td><strong>Continuous Supervision</strong></td>
<td>Frequent attendance, inspection, service, care and maintenance of the electrical installation by skilled personnel who have experience in the specific installation and its environment in order to maintain the installation in satisfactory condition</td>
</tr>
<tr>
<td><strong>Danger</strong></td>
<td>Risk of injury to persons (and livestock where expected to be present) from fire, electric shock, burns, arcing and explosion arising from use of electrical energy, and mechanical movement</td>
</tr>
<tr>
<td><strong>Dutyholder</strong></td>
<td>Every person who has, by virtue of a contract or tenancy, an obligation of any extent in relation to the maintenance or repair of non-domestic premises, or any means of access or egress to or from. This includes the CO/HoE, DE DD EM and any Maintenance Management Organisation (MMO). In this guidance the ‘Dutyholder’ refers to the CO/HoE unless it is clearly shown that someone else is carrying out the duties on their behalf e.g. ‘the DE DD EM as Dutyholder’ or the MMO as Dutyholder’</td>
</tr>
<tr>
<td><strong>Electrical Appliance</strong></td>
<td>An item of current-using equipment other than a luminaire or an independent motor</td>
</tr>
<tr>
<td><strong>Electrical Equipment</strong></td>
<td>Any item for such purposes as generation, conversion, transmission, distribution or utilisation of electrical energy, such as machines, transformers, apparatus, measuring instruments, protective devices, wiring systems, accessories, appliances and luminaires</td>
</tr>
<tr>
<td><strong>Fixed Equipment</strong></td>
<td>Equipment designed to be fastened to a support or otherwise secured in a specific location</td>
</tr>
<tr>
<td><strong>Hazardous Area (Location)</strong></td>
<td>Area in which an explosive gas atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of apparatus</td>
</tr>
<tr>
<td><strong>Houses in Multiple Occupancy (HMO)</strong></td>
<td>A building or part of a building (flat) which is occupied by more than one household (see Household) and where at least one of the households share or lacks access to basic amenities (cooking, toilet etc.) and occupation by the households is as their main residence and it is the sole residential use of the accommodation. HMOs include bedsits, hostels, accommodation above shops, shared houses and flats, houses partly converted into self-contained flats and buildings fully converted into self contained flats where the conversion work does not comply with the 1991 Building Regulations and where less than 2/3 of the flats are occupied by long leaseholders. See sections 254-259 of the Housing Act 2004 for a full definition</td>
</tr>
<tr>
<td><strong>Injury</strong></td>
<td>In the context of the guidance: Death or injury caused by electrical means or from fire or explosion initiated by electrical energy</td>
</tr>
<tr>
<td><strong>Inspection</strong></td>
<td>Examination of an electrical installation using all the senses as appropriate</td>
</tr>
<tr>
<td><strong>Inspector</strong></td>
<td>In this guidance the “Inspector” refers to a Competent Person who is given the responsibility to inspect and test an electrical installation</td>
</tr>
<tr>
<td><strong>Maintenance Management Organisation (MMO)</strong></td>
<td>The generic term MMO has been used to represent the contractor providing maintenance services under all delivery methods, e.g. PPP / PFI / RPC / MAC/Stand Alone Prime</td>
</tr>
<tr>
<td><strong>Portable Equipment</strong></td>
<td>Electrical equipment that is moved while in operation or which can be easily moved from one place to another while connected to the supply</td>
</tr>
<tr>
<td><strong>Single Living Accommodation (SLA)</strong></td>
<td>Domestic accommodation designed for the use of single (unaccompanied) serviceman or servicewoman. For the purpose electrical inspection and testing a SLA is to be regarded as HMO.</td>
</tr>
<tr>
<td><strong>System</strong></td>
<td>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</td>
</tr>
<tr>
<td>Testing</td>
<td>Implementation of measures to assess an electrical installation by means of which its effectiveness is proved. This include ascertaining values by means of appropriate measuring instruments, where measured values are not detectable by inspection.</td>
</tr>
</tbody>
</table>
Annex D – Further References

• BS EN 60079 series, specifically BS EN 60079-17:2007 Electrical Apparatus for Explosive Gas Atmospheres – Part 17: Inspection and Maintenance of Electrical Installations in Hazardous Areas (other than mines)
• BS 7671:2008 Requirement for Electrical Installations IEE Wiring Regulations Seventeenth Edition
• BS EN 61010 Safety Requirements for Electrical Equipment for Measurement, Control, and laboratory Use
• BS 5485:1977 (1993) Specification for Safety Requirements for Indication and Recording Electrical Measuring Instruments and Accessories (BS withdrawn but useful for older instruments)
• BS EN 61241 Electrical Apparatus for Explosive Dust Atmospheres Part 17 Inspection & Maintenance of Electrical Installations
• BS EN 60079-17:2007 Electrical Apparatus for Explosive Gas Atmosphere – Part 17: Inspection and Maintenance of Electrical Installations in Hazardous Areas (other than mines)
• Electricity at Work Regulations 1989
• ESTC standard No. 6 Requirements for the Commissioning, Inspection, Testing and Maintenance of Works for Explosive Facilities 2006 Part 1 – Electrical
• IEE Guidance Note 3 to BS 7671:2008 Inspection and Testing
• HSR 25: Memorandum of Guidance on the Electricity at Work Regulations 1989
• HSE GS38 (revised) Electrical test equipment for use by electricians
• IEE Code of Practice for the In-service Inspection and Testing of Electrical Equipment. 3rd Edition
• JSP 482 MoD Explosive Regulations
• The Electricity Safety, Quality and Continuity Regulations 2002, Statutory Instrument 2002 No. 2665
• The IEE Code of Practice for In-service Inspection and Testing of Electrical Equipment 3rd Edition
• Defence Estates Specification 034 Electrical Installations Edition 1 2004
• APEA/EI: Design, Construction, Modification, Maintenance & Decommissioning of Filling Stations
• DE Functional Standard FS07 Inspection, Maintenance & Testing of Equipment Installed at Petroleum Installations
• Electrical Safety Council’s Best Practice Guide No. 2
• Electrical Safety Council’s Best Practice Guide Number 4 Issue 2a