



ISIS directive  
For BT Operate people

BES/ESV/B011

Issue 13, 02-Aug-2019  
Use until 02-Aug-2021

Published by M&E Compliance & Assurance team

Privacy- None

# ***Electrical Inspection & Test Practice***

*Electrical Inspection & Test Requirements for BT  
Operational Buildings*

## ***About this document ...***

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### **Content approval**

This is the Issue 13 of this document.

The information contained in this document was approved on 02-Aug-2019  
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## Version History

| Version No.    | Date        | Author             | Comments   |
|----------------|-------------|--------------------|--|
| Issue 13       | 02-Aug-2019 | Gary Winter        | Incorporated the Electrical certificates and forms from BES/ESV/A010 as requested by Rob Jones. I have also amended the title to better reflect the new content scope and minor editorial amendments.                      |
| Issue 12       | 31-Dec-2018 | Gary Winter        | Updated appendix forms and content to meet the requirements of the 18th edition of BS7671  |
| Issue 11       | 17-May-2017 | Gary Winter        | Added 'Code Blue' additional service protecting process. And revised Appendix 3C   |
| Issue 10       | 31-Mar-2016 | Gary Winter        | Updated to reflect changes to testing requirements post March 2016   |
| Issue 9        | 18-Mar-2016 | Stephen Pugh       | Author change  |
| Issue 8        | 02-Mar-2015 | Document Manager T | Document migrated onto new platform with no content change   |
| Issue 8        | 11-Mar-2014 | Gary Winter        | Reviewed - minor editorial amendments only.  |
| Issue 7        | 19-Mar-2013 | Gary Winter        | Addition of the new CR17 condition report and a general review.  |
| Issue 6        | 28-Jun-2012 | Gary Winter        | appendix 5 added   |
| Issue 5        | 22-Feb-2012 | Gary Winter        | BS7671 amendment 1 requirements added and forms updated to amendment 1. Appendix 2 forms added for test inspector and CSO  |
| Issue 4        | 11-Feb-2011 | Ian Cahill         | Policy change on sample inspection and test after review. General update   |
| Issue 3        | 26-Jul-2010 | Ian Cahill         | 1.1 & 1.2 Added. 2. Amended to include electronic certificates. Sample testing & record retention detailed. 3.1.1.2, 3.1.1.3, 3.1.2.1 & 3.2.3 added/amended. 4 remedial work amended. 7 Design file & survey form deleted. |
| Issue Draft 2c | 29-Jun-2010 | Ian Cahill         | Additional information on continuity of earth  |

|                |             |            |   |
|----------------|-------------|------------|---|
|                |             |            | connections detailed in 3.1.2.1. Information on the use of different sample circuits to be used on subsequent periodic tests detailed in 3.2.3  |
| Issue Draft 2b | 3-Jun-2010  | Ian Cahill | Inspection detail for conductors & flex cables split into different sub sections 3.1.1.2 & 3.1.1.3. Additional guidance given in Section 4 on types of typical fault items and their associated categories.   |
| Issue Draft 2a | 2-Jun-2010  | Ian Cahill | 1.1 & 1.2 added. 2 amended- new electronic certificates etc. & main schematic requirements. 3 amended - new policy on sampling & record retention. Section 4 -clarity on remedial rectification. 7 design file & App1 Survey form deleted. Append. re-numbered. |
| Issue 2        | 31-Jan-2006 | Ian Cahill | Clarification on initial 100% inspection added to ISIS & appendices.  |
| Issue Draft 1a | 21-Jul-2005 | Ian Cahill | Clarification on initial 100% inspection added to ISIS & appendices.  |
| Issue 1        | 8-Dec-2004  | Ian Cahill | 1st issue. Conversion from SLA agreement between NLG NRJC   |
| Issue Draft 0b | 19-Nov-2004 | Ian Cahill | Comments from NLG/NJRC meeting included.  |
| Issue Draft 0a | 11-Nov-2004 | Ian Cahill | 1st Draft   |

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# 1 *Introduction*

This document details the inspection and test requirements for all electrical systems at sites within the BT operational estate. It gives direction on the electrical records required for both electrical install, modification and periodic inspection and testing as per Part 6 of the current edition of BS7671 and details inspection and test practices and processes that must be applied when carrying out Initial Verification and Periodic Inspection and Test (commonly referred to within BT as A56 testing).

The practices detailed in this ISIS are mandatory; they must be followed without departure from the requirements detailed within this document. Any deviation must be approved by the Author of this document, however minor.

The current edition of BS7671 and IET Guidance Note 3 are interpreted, and then implemented in this ISIS document.

Power Governance formerly the 'Code Blue' process must be followed and is detailed within UK Power briefing 315 available from [here](#) and as briefed out to field teams. Other briefings and notices may apply and will need to be checked before undertaking any electrical works or electrical testing within BT operational buildings.

## 1.1 **Inspection & Test**

### 1.1.1 **Standard**

Inspection and tests as per BS7671 part 6 shall be carried out with the support of a BT Client Representative (CRep) and in accordance with the methods described in IET Guidance Note 3. BT policy aligns with BS7671, IET Guidance Note 3 and its practices aligned with the nature of our estate. BT's policy is not to retrospectively bring installations up to the current regulations unless identified as unsafe. When remedial work is carried out, or additional circuits are added or existing circuits are modified, the parts of the electrical infrastructure affected (including the LV supply route to source if applicable), by the addition or modification must comply with the current edition of BS7671 or exceptionally to manufacturers or designers' specifications and installation requirements (where this is the case, the Author must be informed, and all associated drawings, designs and records appropriately marked to indicate the deviation from the standard). The process for planned Periodic Inspection and testing works is detailed in [CPG29020](#) and must be followed, new circuit design is covered within ISIS [BES/ESV/A010](#).

[UK power briefing 315](#) must be followed for the process of releasing circuits for test within appendix 2 of the briefing. The BT CRep will follow and

complete the A56 process tick sheet without exception. When completed the tick sheet will be retained by the BT manager responsible for the site for a period of at least 24 months.

## **1.2 Frequency of Inspection and Test**

The maximum period between Inspection and test certificates for BT operational buildings is 5 years. IET Guidance Note 3 section 3.7 provides information on frequency of inspection and test. Where increased frequency of inspection and test is considered necessary by the inspector, this must be communicated to the ES planning team who will then investigate, and where required instigate a replacement/upgrade of the electrical system.

NOTE: This decision must be based upon the future use of the building and long-term viability – e.g. if a site is in the process of being mothballed and due to be closed then it may well be appropriate to carry on inspection and testing at the recommended frequencies, till its closure.

New circuits and existing circuits that are modified shall have initial verification tests carried out and recorded as required by the Electricity at Work Regulations: 1989 (EAWR) and the current edition of BS7671 part 6.

## **1.3 Inspector Competency**

Any person or persons carrying out Electrical Initial; Verification and /or Inspection and Test must comply with BS7671 Regulation 641.6 & 651.5 and regulation 16 of the EAWR – i.e. be a skilled person (electrically) competent to verify that the requirements of the standard have been met. Below are qualifications required to carry out Inspection and Test within BT.

- C&G 2391 (or equivalent)
- C&G 2382 – 18<sup>th</sup> edition Requirements for Electrical installations

BT's additional requirement is that any contracted suppliers that are carrying out this type of work are a current member of a registration authority i.e. CERTSURE (NICEIC), ECA, NAPIT or similar. Any non-contracted supplier must also be competent to carry out the works that they are undertaking and be a member of one of the above registration authorities.

## **1.4 Pre-start meeting and Induction**

No works shall be started without either a pre-start meeting (larger works) or an induction by the BT CRep. Where central programmes of works are carried out this may be a pre-start meeting and then licenced working where pre-start or induction meetings are not required other than at the commencement of a project and for any new staff to the program.

The induction meeting will need to cover off the housekeeping and fire alarm tests as well as works specific requirements. Pre-stat meetings are covered in other ISIS and processes and briefings and these will be part of the contract or works instructions.

## **2                    *Documentation and Certification***

- All design data, test results and reports/certificates of previous inspections and tests together with drawings for the electrical installation and building layout shall be made available to the installer (if required) or Inspector (required) by the ES planning manager or his nominated representative and as detailed in CPG29020 for A56, prior to work commencing. Where electrical installation records are incomplete or of doubtful accuracy, reference must be made to section 3.3 of this document.
- Current Electrical forms, schedules and certificates are contained within the appendix(s) section of this document and shall be used for recording all electrical inspections and tests of fixed electrical wiring by BT and BT's contracted suppliers. These will be in Word document format and 'sealed' with a digital signature as detailed in BES/ESV/A010 and as required to meet the requirements of BS7671 regulations 644.5 & 653.5. Paper certificates & documents (software derived or pre-printed pads) will only be accepted in exceptional circumstances, based on the following requirements

prior agreement from the ES Power Planning teams responsible for a site

for non-contracted suppliers only if it is an approved NICEIC / ECA or NAPIT format.

Hand written, or self-generated reports will NOT be accepted under any circumstances

Periodic inspection and test of a site is not complete until the following are sent to, and accepted as satisfactory by, the appropriate ES Planning team:

- A Periodic Inspection Condition Report (CR) – Digitally signed.
  - Program Management Completion Notice (Appendix 3)
  - Remedial works (faults) – digitally signed and limitations list (Appendix 2 and 4).
  - Full set of Test and Measurement Schedules (STR's) – digitally signed
  - Any other associated documentation and amended drawings.
1. Electrical Installation Certificates (EIC) and Schedules of Test Results (STR) shall be used to record inspection and test results associated with new installations. NOTE: New circuits resulting from remedial work identified



during inspection and testing activities and for modification of existing circuits - minor works certificates are NOT allowed by BT Policy – see BES/ESV/A010 for details.

2. Design data should exist in either Hevacomp or Cymap for all operational sites. The ES planning team responsible for that site must check the design against inspection and test results for completeness. Where no design data exists for circuits or the LV distribution, this will be built by the ES planning teams. All new works shall be updated within the Hevacomp or Cymap design within 60 days of works completion by the ES planner responsible for that site or works.
3. The Installer or Inspector shall highlight any amendments necessary to AutoCAD drawings to the ES planner. This shall be by showing amendments as red lines for removal or disconnections, and green lines for installation / amendment of circuits / equipment on AutoCAD files where this facility exists or by a similar arrangement on paper/PDF drawings for update by the ES planner, BT Drawing office facilities or contract resource where available – other options are available and should be agreed first with the local planning manager, for example PDF files with notes.
4. Amendment(s) to existing main equipment position drawings shall be by the same protocol as outlined in item 3 above for ES Planning approval.
5. Requirements for both schematic drawings and main equipment position drawings are detailed in section 5.1 of this document.
6. electronic electrical records / certificates and forms shall be returned to ES Planning via email (or another system by agreement) – to the planner detailed in the front sheet of the job pack.
7. The Inspector shall amend or provide as necessary (where missing) Fuse board and distribution schedules. They shall be placed in or adjacent to each distribution fuse board throughout the electrical distribution system. Use of a suitable clear plastic holder is acceptable.
8. The Inspector shall amend software produced main power schematic diagram detailing intake, alternative sources of supply, main and first sub-main distribution and for each discrete distribution system (Hevacomp or CYMAP). This schematic drawing shall be approved by ES Planning as part of the job pack and shall be updated by the ES planner and placed in a prominent position in the main power intake/generator/LV Power room to comply with BS7671 regulation 514.9.1.
9. Where an additional (to the main supply) DNO supply is identified at a site this must be noted and highlighted to the ES planner (along with the MPAN No.) – BT may be responsible for this system and if this is the case it will be advised to the supplier by the ES planner and be inspected and tested as part of the whole site inspection. Where it is not, a copy of the condition report shall be obtained by the BT planner for inclusion in the records.

### 3 *Inspection and Testing*

All test equipment used for Inspection and Test (and initial verification) shall be calibrated and tested for electrical safety in accordance with the manufacturers' recommendations and meet the requirements of the current edition of BS7671 regulation 643.1 and the relevant parts of BS EN 61557. An auditable process of equipment calibration must be available upon request. Current calibration certificates of testers complete with calibration labels must be available for inspection upon request. Additionally, an effective system to check the on-going accuracy of test instruments shall be put into place. This may be achieved by either:

- Maintaining records of comparative cross checks with other test instruments or
  - Maintaining records of the characteristics of reference circuits or devices.
1. Every electrical circuit either installed or modified shall be initially verified as per part 6 of the current edition of BS7671 and IET Guidance note 3. There are no exceptions to this requirement other than like for like accessory replacements only.
  2. The periodic inspection and test must report on the safety of the **WHOLE INSTALLATION**. This may be based on a full or sample basis as described in sections 3.1 and 3.3 respectively. The decision to adopt sample inspection and testing shall be made by the Inspector following direction detailed in this document. Their decision shall be notified to the appropriate ES Power Planning manager or his representative for concurrence. Further guidance is given in section 3.3 of this document.
  3. Where alternative sources of supply are present and available (generator or UPS for example) the Earth Fault Loop Impedance (EFLI) and Prospective Fault Current (PFI) readings for each source must be recorded in the supply parameters section of the Condition report or Electrical Installation certificate. For sites with highly complex distribution systems, i.e. those with multiple transformer and generator configurations, the "normal" and most onerous configuration i.e. the highest values of Prospective Short-Circuit Current (for comparison with the breaking capacity of the appropriate protective device) and Earth Fault Loop Impedance (for disconnection) should be considered as a minimum. The source impedance and fault current associated with generators should be found by enquiry. If the manufacturer details cannot be obtained the following data should be recorded: Source impedance "20%", Fault current "3 x full load Amps". These readings can be obtained with the generator set on load or off load as there will be no difference in the readings obtained.
  4. Control panels and equipment containing sensitive electronic equipment, for example: Central chiller plant, Boiler, Fire alarm, Fire Flood and Gas (FF&G), Uninterruptible Power Supply (UPS) and Generator control panels, should not

be subjected to electrical testing. This equipment should be visually inspected only, and earth continuity and polarity verified.

5. Where a UPS 1, 2, 3 or 4 (PIRM Categories) are installed the prospective fault current at the downstream point in the distribution system, will need to be calculated and detailed as a limitation. For rotary UPS backed distribution, the prospective fault current can be measured by means of a test. The fault withstand capacity of the static bypass switch should be checked to ensure that it exceeds the calculated or measured prospective fault current at that point in the distribution system.
6. Residual Current Devices (RCDs + RCBO's) contained within MIDPs and other equipment racks or providing supplementary protection or fire protection for circuits are manually tested and reset every six months to ensure correct mechanical operation of the contacts. MIDPs (note these have a 20 $\Omega$  resistance to earth), including electrical tests on RCDs must be included in the sample for periodic inspection and testing of the fixed wiring installation on a 5-yearly basis by use of a meter. All other RCDs shall be manually tested and reset on a 6-monthly basis (Notice should be present BS7671 514.12.2).
7. The Installer or Inspector shall display warning notices in the areas that the work is being undertaken or is affecting (e.g. lighting / power interruptions), indicating that works or Inspection and Testing is taking place and the engineers must log onto the BT on-site register, A Notification of Works (NoW) will have been raised by the ES planner and be detailed in the job pack (refer to CPG 29020 for A56 testing). The Installer or test inspector shall also log onto the BT on site-log each day for each and every site they attend.
8. To prevent damage to fixed electrical items of plant and equipment that are required to be tested, the manufacturers' operating, and maintenance instructions shall be adhered to. It should be noted that electronic components within equipment under test may be damaged by the applied test voltages/currents so must be isolated at time of test or the test voltage limited to 250volts (if permissible).
9. Where long breaks in power to Telecommunications Equipment are anticipated, temporary power feeds may be required. Reference to the planned engineering works ISIS [PRD/SNC/A120](#) and UK Power briefing 315 for details of when and what is required.
10. DC Plant

The process detailed within UK Power briefing 315 and the BAU power governance requirements must be followed for all DC power plant.

The fixed wiring to the various Power Equipment Rack (PER) types may be tested from the IEC60320 Rectifier connectors, main ac termination adaptable box or other appropriate point of connection.

**Warning:** Under no circumstances should the presence of an earth potential on adjacent or extraneous conductive parts be verified using an earth loop impedance tester, or an insulation resistance tester (500V or 250V setting), on any power plant associated with Telecommunications equipment (DC power systems etc.).

The inspection and test shall extend only to the main connection terminals of any fixed equipment. Under no circumstances should the neutral conductor be disconnected while the plant is powered, or the plant powered up without a neutral conductor connected and verified or the rectifiers will be damaged.

11. Engine control cubicles containing 13A socket outlets used for test and monitoring purposes are within the scope of this document. Motor circuits on fans, pumps, etc. Including the starter, over load protection and emergency stop switch, which are supplied from control panels shall be checked in accordance with normal inspection and test procedures.

12. Lifts and Lift controllers shall be excluded from inspection and testing as they are maintained by others. The switch, and cable feeding the Main Lift isolator(s) in the Lift control room, will be subject to inspection, and test. A lift maintenance officer will need to place the lifts out of service before such testing is carried out this will be arranged by the BT CRep.

13. Fixed hard wired (not extension leads or klik, daisy chained type proprietary systems etc. which are PAT tested) office furniture electrical distribution shall be treated as fixed wiring where it is supplied by a fused connection unit or switch fuse and conduit to the desk system and shall be inspected and tested accordingly.

14. Lighting fittings either hard wired or supplied via plug and socket type ceiling roses shall form part of the inspection and test works detailed in this and associated documents, desk and inspection lamps are not.

15. Where necessary for operational reasons, inspection and test work may be required to be completed outside of normal working hours including weekends for specific plant or circuits. Further reference must be made to ISIS PRD/SNC/A120 with respect to normal and out of hours working requirements.

16. In addition to PEW applications (see ISIS PRD/SNC/A120) and prior to carrying out inspection and test work on third party distribution / equipment, the customer should be informed of the proposed work. For example, Openreach requires the LLU PoP repair SMC team (0800 0282268 - option 2) to be advised of the scheduled testing event to notify customers so that they can prepare accordingly. The Openreach SMC would not be asking for customer permission, merely giving advanced notice. This shall be done by

the BT CRep or planner, but the test inspector or installer is required to confirm circuits or equipment can be isolated before commencing work.

A minimum notice period of 5 working days is usually required.

Make certain that the procedures used prior to the temporary disconnection ensure that a check is made of the BT maintained DC and UPS equipment as detailed in item 9.

It is necessary to check that the system restores on completion with no alarms and this should be done by the BT CRep.

Finally, a call to the customer control (SMC in the case of LLU) on completion of the inspection & test work would allow the case to be closed with the customers – again done by the BT CRep.

### **3.1 Full Inspection and Test Requirements**

An inspection and Test check list can be found in Appendix 1, Section 6 of this document and shall be completed for an installation and form part of the information returned to ES Planner.

Remedial items must be detailed in a remedial works list referenced in the Periodic Report. A Remedial Works list is given in Appendix 2, Section 6 of this document and when complete will form part of the Inspection & Test Report (Faults list).

Where limitations on inspections and test are imposed by BT these must be detailed in a Limitations list referenced in the Periodic Report. A Limitations List is given in Appendix 4 Section 6, limitations will be an exception unless the circuit feeds or is fed from a UPS.

Further guidance on inspection & test is available in the current edition of Guidance Note 3: Inspection & Testing, published by the IET.

#### **3.1.1 Periodic inspection detail**

Detailed inspection is required for all accessible parts of the circuits under test, as detailed in IET Guidance Note 3 section 3.8.

Where applicable faults found in the first sample of accessories inspected will require a further sample to be inspected. Further faults found will require all accessories on the affected circuit to be inspected – IET Guidance Note 3 section 3.8.4.

##### **3.1.1.1 Joints/Connections**

Joints and connections shall be inspected as detailed in IET Guidance Note 3 section 3.9.1.

A minimum of 20% of the various accessible parts of the electrical installation shall be inspected.

### **3.1.1.2 Conductors**

The condition of a minimum 20% of the installed conductors shall be inspected.

### **3.1.1.3 Flexible Cables and Cords**

Flexible cables and cords shall be inspected.

### **3.1.1.4 Accessories and Switchgear**

Accessories and switchgear must be thoroughly inspected for mechanical and electrical condition and operation as detailed in IET Guidance note 3 section 3.9.1.

### **3.1.1.5 Protection against Thermal Effect**

Protection against thermal effects shall be inspected as detailed in IET Guidance Note 3 section 3.9.1.

### **3.1.1.6 Basic & fault protection**

SELV, PELV and double insulated installations shall be inspected as detailed in IET Guidance Note 3 section 3.9.1.

#### **Basic protection**

Basic protection shall be inspected as detailed in IET Guidance Note 3 section 3.9.1.

Placing out of reach and the use of obstacles is not the normal form of protection within BT.

#### **Fault Protection**

Basic fault protection shall be inspected as detailed in IET Guidance Note 3 section 3.9.1. Protective Devices

Protective devices shall be inspected as detailed in IET Guidance Note 3 section 3.9.1.

### **3.1.1.7 Enclosures and Mechanical Protection**

Enclosures and mechanical protection shall be inspected as detailed in IET Guidance Note 3 section 3.9.1

### **3.1.1.8 Marking and Labelling**

Marking and labelling shall be inspected as detailed in IET Guidance Note 3 section 3.9.1.

Check references on all distribution equipment and drawings are based on a logical sequence determined by the power supply, phases and distribution way number from the upstream equipment from which they are fed.

Generally labelling shall be limited to main and sub main power distribution equipment down to distribution fuse board and local switchgear level. For distribution equipment supporting 21CN installations labelling will be

continued to component level, i.e. each accessory shall be labelled with circuit details.

#### **3.1.1.9 External Influences**

External influences shall be checked as detailed in IET Guidance Note 3 section 3.9.1.

### **3.1.2 Periodic Testing Detail**

Tests to be made shall be in accordance with IET Guidance Note 3 section 3.10.2.

#### **3.1.2.1 Continuity of Protective Conductors including main and supplementary bonding**

Testing shall be carried out as detailed in sections 3.10.3, of IET Guidance Note 3

Where testing of trunking and Conduit containment systems used as a Cpc indicates a problem with continuity a new separate CPC should be run in for each effected circuit.

#### **3.1.2.2 Ring Main Continuity**

#### **3.1.2.3 Where there are records of previous tests, this test may not be necessary unless there may have been changes made to the ring final circuit.**

#### **3.1.2.4 Insulation Resistance**

If tests are to be made: reference to Table 3.4 – 3.10.2 insulation resistance shall be tested in accordance with sections 3.10.3 b of IET Guidance Note 3

#### **3.1.2.5 Polarity**

Polarity shall be tested in accordance with sections 3.10.3 c of IET Guidance Note 3

If it is evident from inspections that there have been no alterations or additions, then a minimum of 10 per cent of all single-pole and multi-pole control devices and of any centre-contact lamp holders shall be tested.

If any incorrect polarity is found, then a full test should be made in that part of the installation supplied by the distribution board concerned.

#### **3.1.2.6 Earth Electrode Resistance**

The earth electrode resistance associated with both the intake Main Earth Terminal (MET) and the telephone exchange earth electrode system shall be measured. The MET earth electrode and the exchange earth electrode system shall be measured with a Chauvin Arnoux earth clamp tester and the results included in the appropriate schedule of test results. An exchange

functional earth electrode resistance measurement of  $8\Omega$  or greater must also be recorded as an item requiring improvement i.e. code 3 and further detail is contained within ISIS [EPT/PPS/B025 – Earthing Manual](#). This does not constitute a code 1 or 2 safety related remedial fault but must be dealt with promptly to safe-guard continued network service as resistances above  $8\Omega$  can cause signalling difficulties, transmission troubles, such as crosstalk.

Standard test methods are detailed in IET Guidance Note 3 section 2.7.13.

**Under no circumstances** should the main or functional earth be removed while the supply is live as this could potentially be deadly to the test inspector and/or anyone present in the building.

#### **3.1.2.7 Earth Fault Loop Impedance**

Earth fault loop impedance shall be tested in accordance with section 3.10.2 and reference to table 3.4 – reference to section 2.7.15 of IET Guidance Note 3 can also be followed for guidance

The origin of incoming Supplies at High Voltage (11kV) shall be taken as the 11kV/450V transformer. The associated LV breaker/fuse switch with the star point earth connection shall be used to determine the Characteristics of the supply. For such installations, calculation is the only practicable method of obtaining an accurate value of  $Z_e$  or  $PSI$  where this is not available on existing electrical records. This is due to the poor resolution of test instruments at low impedance values associated with transformers and high voltage supplies and the practicalities of making the whole installation dead. However, calculation alone does not prove that the required earthing is in fact present and so measurement, (for operational reasons this may be taken further downstream of the intake), should be made to prove connection and that readings are within acceptable range. This operational restriction must be noted in the "limitations of inspection" section of the periodic report.

Section 4.5 of IET Guidance Note 3 provides further information on earth loop impedance testers.

#### **3.1.2.8 Operation of residual current devices**

RCDs shall be operated and tested in accordance with section 3.10.2 and table 3.4 guidance is available in section 2.7.18 of IET Guidance Note 3

#### **3.1.2.9 Operation of Overcurrent Circuit-Breakers**

Overcurrent circuit breakers shall be operated in accordance with section 3.10.3 d of IET Guidance Note 3 - Operation of Devices for Isolation and Switching.

Operation of isolation and switching devices shall be carried out in accordance with section 3.10.3.e of IET Guidance Note 3

#### **3.1.2.10 SPD's and AFDD's**

These shall be inspected and tested as per the manufacturer's instructions



## 3.2 Thermographic Surveying

Where it is not possible, for operational reasons i.e. UPS PDU Feeder cables, to carry out full inspection and test on circuits within an equipment area the limitation must be noted on the periodic report. Inspection and test must be carried out as far as is practicable and must be supplemented by Thermographic surveying as detailed in section 4.9 of IET Guidance Note 3. Full inspection and test shall be carried out at the earliest opportunity, taking advantage of any scheduled or un-scheduled system outages associated with the equipment served. This requires effective communication and co-operation between the equipment manager and the Capacity Delivery Team responsible for the installation.

From July 2017 premium sites within the testing programme will have a thermographic survey completed – details contained within NP&C bulletin [PAC048](#).

## 3.3 Sample Inspection and Testing

### 3.3.1 Initial Inspection

An initial visual inspection of the whole electrical installation shall be carried out paying attention to:

1. The age and condition of the electrical installation. The condition shall include an assessment of any damage, deterioration or defects.
2. The correct use and installation of electrical equipment.
3. Evidence of effective change management, i.e. there are no unrecorded/uncertified connections.

### 3.3.2 Installations where sampling may not be appropriate

Where existing records are not available or are inconsistent or incorrect this will preclude sample testing. This may affect the whole building or just a specific part. This may allow the use of sample testing or increasing the sample in specific areas without full and complete records – this will need to be agreed between the test inspector and the power planner / CRep.

### 3.3.3 Installations where sampling may be considered

1. The decision to adopt sample inspection and testing shall be made by the Inspector following direction detailed in this document. His decision shall be notified to the appropriate Planning manager or his representative for

concurrence. The decision to utilise sampling will be based upon the following criteria: -

- The Inspector must have access to accurate inspection and test documentation for all circuits including those from the last inspection & test. They shall be either directly accessible electronically or be paper copies of the same.

**Warning: Previous test results for circuits not forming part of the sample must be kept with the last inspection and test report and test & measurement schedules. All other previous certification reports and schedules may be archived for future reference / audit.**

- The inspector shall compare all existing electrical records against the complete physical electrical installation to ensure that no un-recorded additions or modifications have been carried out since the last periodic inspection and test any such omissions can be added to the appendix 2 as a Code 3 – improvement recommended.
- UPS distribution circuits and fixed power outlets to equipment racks are deemed to be fixed for the purposes of this document. (I.e. Commando Socket Outlets under floor below rack positions are included but flexible plug and socket arrangements / OLSEN strips, PDU etc. within racks or equipment plugged into the commando Socket are not, these will be covered by PAT testing as detailed in BES/ESV/B107 - Refer to UK Power Briefing 315 for the process for UPS – appendix 2

1. Sampled circuits must be representative of those installed i.e. representative and a fair sample taking into consideration type, load, age and condition.
2. The selected sample must be fully visually inspected and tested with results recorded on test and measurement records. Faults found within the sample will result in an increase in sample size by a factor of two
3. Definition of faults shall include test results significantly different from previous records or other indication from either inspection or test that a part or parts of the electrical installation are, or are about to become, unsafe.

Circuits included in any sample must be indicated as part of the sample on the Test & Measurement Schedule. Previous test results on circuits not forming part of the sample shall also be input on the new schedules and indicated as not forming part of the sample. Different circuits must be inspected & tested in the subsequent periodic inspection & test.

### 3.3.4 Sample Inspection

1. 20% of accessible parts and parts accessed via partial dismantling, i.e. the removal of covers held in place by screws or bolts, of the installation shall be visually inspected.

2. Where representative sampling is to be adopted, all accessible parts associated with the sample of final circuits shall be fully inspected as detailed in section 3.1.1. The representative sample size shall be determined as indicated in section 3.3. Where any faults or deficiencies are found, the sample shall be increased by a factor of two.

### 3.3.5 Sample Testing

1. Sample testing shall be carried out generally as detailed in section 3.1.2.
2. A representative sample of all final circuits shall be tested as per IET guidance note 3 section 3. The sample must include an agreed proportion of each of the final circuits fed from all final distribution fuse boards.

## 4 Remedial Works

BT policy is not to retrospectively bring installations up to the present regulations unless unsafe. When additional circuits are added, the parts of the electrical infrastructure affected by the addition shall comply with BS7671 current at the time of work. The periodic inspection and test report shall comment on the condition of the whole installation in general, listing in detail departures from the present regulations. Suggested remedial works required to bring the installation up to the present regulations will be required. The report shall identify the following:

- Code 1 – ‘Danger present’. Risk of injury. Immediate remedial action required.
- Code 2 – ‘Potentially dangerous’. Urgent remedial action required.
- Code 3 – ‘Improvement recommended’. Note BT is currently not funding Code 3 remedial works unless it is operationally required

**Any code 1 or code 2 faults must result in an unsatisfactory test certificate and will require remedial works completed and a completed appendix 6 to allow for a test certificate to become satisfactory.**

### Remedial Work Completion Timescales

Code 1 Remedial work – remediated or made safe at time of test. If not made safe, then 1 Week plus any required component lead-time. Where remedial work cannot be addressed immediately by the test inspector the installation must be made safe until the remedial work can be completed. A BT Escalation for non-compliance will be raised if works and records are not returned by day 90 from test completed date.

Code 2 Remedial work - 2 Weeks plus any required component lead-time where practicable. Larger works may take extended time due to complexity or

size of the remedial works required but must take no longer than 90 days from test completion date.

Code 3 – 90 days from test completion date to resolve or close off as no further action required by the BT planner.

Note: minor faults highlighted at time of test by the CRep/planner or supplier should be reported to power maintenance via the heating and lighting portal for repair, by the planner – these will include pull cord replacement, lamp replacement light fitting not working, accessories damaged or similar items that would normally be repaired/replaced by local power maintenance engineers as BAU – refer to PAC028.

Refer to [PAC028](#) for further guidance of Code observation

Any faults identified by the thermographic survey at time of A56 inspection and test will be addressed by the BT CRep – and /or entered onto the ES lighting and heating portal faults reporting system for remediation by ES maintenance. The time frames detailed above apply.

|   |   |
|---|---|
| <p>Examples of common code 1 'Danger present'<br/>Risk of injury.<br/>Immediate remedial action required items<br/>(Note this is only a small sample of the type of item that would be noted as code1)</p>                    | <ul style="list-style-type: none"> <li>■ Exposed live conductive parts, (note this DOES NOT include designed un-insulated conductive parts within a normally closed and preferably lockable enclosure or where a tool is required to open the enclosure);</li> <li>■ Missing fuse carrier or circuit breaker without a blanking piece fitted</li> <li>■ Cut or abandoned live cables.</li> <li>■ Accessories badly damaged.</li> <li>■ Incorrect polarity</li> <li>■ Conductive parts that have become live as the result of a fault</li> </ul> |
| <p>Examples of common code 2 'Potentially dangerous' - remedial works<br/>(Note this is only a small sample of the type of item that would be noted as code 2, it is not possible to list every conceivable code 2 fault)</p> | <ul style="list-style-type: none"> <li>■ Absence of a reliable and effective means of earthing / use of a public utility pipe</li> <li>■ Cross-section area of the protective conductor does not satisfy adiabatic requirements – 543.1.1.</li> <li>■ Absence of earthing at a socket-outlet.</li> </ul>  |

|  |   |
|--|---|
|  | <ul style="list-style-type: none"> <li>■ Absence of main protective bonding or inadequate cross-sectional area (less than 6mm<sup>2</sup>)</li> <li>■ Absence of fault protection by RCD where required</li> <li>■ Circuits with ineffective overcurrent protection.</li> <li>■ Protective device installed in a neutral conductor only.</li> <li>■ Earth fault loop impedance value greater than that required for operation of the protective device within the time prescribed in BS7671 current at the time of installation.</li> <li>■ A ring final circuit having a discontinuous conductor or cross connected with another circuit.</li> <li>■ Borrowed neutrals</li> <li>■ Insulation resistance less than 1MΩ</li> <li>■ Insulation of live conductors deteriorated to such an extent that insulation material readily breaks away.</li> <li>■ Fire risk from incorrectly installed electrical equipment or unenclosed electrical connectors.</li> </ul> |
| Code 3 'Improvement required' - remedial items | <ul style="list-style-type: none"> <li>■ Absence of RCD protection for a socket outlet where required.</li> <li>■ Reliance on a voltage operated earth leakage circuit breaker – Regulation 542.2.6</li> <li>■ Absence of quarterly test notice for any RCD or voltage operated earth leakage circuit breaker.</li> <li>■ Absence of 'safety electrical connection – Do Not Remove' notice.</li> <li>■ Absence of a notice indicating that the installation has wiring colours to</li> </ul>  |

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|--|--|
|  | <p>two versions of BS7671 (if appropriate)</p> <ul style="list-style-type: none"> <li>■ Absence of Instructed person use only label.</li> <li>■ Absence of a schematic diagram at the incoming supply source (main LV switch panel or power room)</li> </ul> |
|--|--|

## 4.1 Redundant Cabling

Where redundant cabling is identified and is not recorded as a spare circuit and live as part of new works or inspection and testing it must be recovered where this is practicable and approved. Where this it is not practicable, the redundant cabling must be left connected at both the distribution and supply terminations and marked and recorded as redundant cabling and circuits on the STR. It must be verified as isolated and proven dead. Exceptionally where it is not connected at distribution and supply terminations, cut back to maintain a minimum separation of 1 metre from any electrical distribution supply point. This cable must be sealed and labelled at both ends to indicate that it is dead and must include the name and contact number of the inspector. Additionally, the location of this redundant cable must be made known to Planning in order that it can be recorded on the master record (STR's) and a job can be logged under the B134 programme, sub programme 2605 to recover the redundant electrical cabling and/or distribution if required or marked and recorded as a spare circuit and left live. A resolution must be scoped within a 90-day time limit. It is not necessary to inspect and test redundant cabling, but it is spare live circuits.

Where an area of redundant telecommunication equipment is identified, it must be established via the platform manager whether electrical circuits in the area can be disconnected. If this is the case, arrangements must be made to have the circuits totally electrically isolated, locked off from the remaining electrical installation and a warning label fitted to the point of isolation and a certificate of isolation issued.

It is not necessary to inspect, and test circuits associated with redundant isolated equipment.

# 5 Labelling

1Where required by 3.1.1.8 all plant items and individual components shall be clearly labelled with the circuit designation shown on the drawing(s) and measurement schedule. Where abbreviations are shown on a drawing with the full text for that abbreviation shown elsewhere on the drawing(s), the label shall show the full text and not the abbreviation. Abbreviation of the text will only be permitted when limiting the size of the label to ensure it fits the

component makes it necessary. Where labels do not exist, the Inspector will be required to provide labels.

Printed self-adhesive labelling shall be used. Characters shall be clearly legible and spacing of characters and words shall be such that the label can be easily read and understood. The minimum character height shall be 4.5mm unless otherwise instructed by the CSO or Capacity Delivery Power Planning. The colour of the lettering and the background of the labels shall be black lettering on white background for non-essential and red lettering on white background for essential service supplies.

Embossed Dyno tape labels shall **not** be used.

Warning labels shall be in accordance with IET Guidance Note 3 section 3.9.1.

Fuse board and distribution schedules shall be replaced if existing is missing or unreadable, replacements should be installed and supplied in or adjacent to the distribution boards. A suitable clear plastic holder is acceptable.

Where socket outlets contained within cable managed furniture form part of the fixed wiring installation (i.e. are connected to a fused spur or isolator in fixed containment – not flexible cables), an appropriate label shall be affixed to each bank of sockets stating as a minimum, the name of the Inspector and the date of the test.

During execution of the works the Inspector shall identify and label, by means of a numbered collet, all line conductors and neutrals present in fuse boards corresponding to their fuse notation. The same shall apply to all Cpc's present. Main bonding connections to main earth bars shall be labelled as to their purpose, i.e. "Main Bond Water" or "Main Bond Lightning Protection" etc.








## **5.1 Main Distribution Equipment Location Plans**

The following distribution equipment shall be accurately marked onto the floor plan together with any reference numbers applicable:






- Main incoming Supplies.
- Switch fuses and Fused-Switches.
- Generators.
- Isolators (**not** those in final circuits).
- Mobile Generator Connection Panels.
- Changeover Switches (**not** those in final circuits)
- Uninterruptible Power Supplies (UPS).
- Busbar chambers.
- Mains Isolation Distribution Panels (MIDP).

- Main and local load centre Switchboards.
- Main Earth Terminal (MET).
- Distribution Boards and consumer units.
- Exchange earth bar.
- Points of main bonding connection indicate the cable type and size.

## 6 Appendices

| Form  | Description   |
|---|---|
| <b>Inspection and test appendix forms</b>   |   |
| <br>esvb011a.doc                     | <b>Appendix 1</b> - Periodic Electrical Inspection and Test Checklist   |
| <br>b011b2.doc                       | <b>Appendix 2</b> - Remedial Works template for test inspectors.  |
| <br>Contractor's<br>APPENDIX 3.doc | <b>Appendix 3</b> – programme completion Report - Periodic Inspection and Test and Remedial Works – now including thermography. |
| <br>esvb011d.doc                   | <b>Appendix 4</b> - Limitations list.   |
| <br>infora.doc                     | <b>Appendix 5</b> - Information change list   |
| <br>appendix 6.doc                 | <b>Appendix 6</b> - remedial closure (from appendix 2)  |
| <b>Forms and Certificates</b>   |   |
| <br>EIC Certificate<br>18.0.doc    | <b>EIC</b> - Electrical Install Certificate   |



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|---|--|
| <br>New Condition<br>Report.docx     | <b>CR</b> - Condition Report   |
| <br>new STR.docx                     | <b>STR</b> – Schedule of test results  |
| <br>new DC STR.docx                  | <b>DC STR</b> – DC only Schedule of test results   |
| <br>NEW STR<br>schedule.docx         | <b>STR Schedule</b> – schedule of inspections (New circuits only and can be combined with the STR into one form if required) |
| <br>Fuse Allocation<br>form 18.0.doc | <b>FA</b> – Fuse allocation request form   |
|   |  |

**END OF DOCUMENT**