



REVIEWING ELECTRICAL INSPECTION AND TESTING CERTIFICATES FOR NON-ELECTRICAL ENGINEERS

Purpose of this document is to provide context and suggestions on how electrical installation, inspection and testing work can be reviewed by a non-technical person.

The document aims to provide a checklist and explanation for a non-technical person reviewing an electrical installation certificate and electrical inspection condition report.

The document does not replace or supersede the opinion and judgment of a suitably qualified electrical engineer.

(EDIS is the Electrical Distribution Information System)

www.electricalcertificates.co.uk



After reading this document you should be able to:

- Understand the context in which electrical certificates are created
- Identify key parts of an electrical certificate
- Understand the significance of the key parts of the certificate
- Request reasonable explanation on information provided in the electrical certificate

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1 EXECUTIVE SUMMARY

On completion of electrical work electrical tests are required. The purpose of electrical testing is to confirm, so far as reasonably practicable, whether the electrical installation is in a satisfactory condition. Test results are presented in electrical test reports and certificates.

On receiving a certificate, it should be reviewed, the test result values cannot be easily understood by the non-electrical engineer, however, the limitations, observations and recommendations can be questioned, clarified and understood. THIs will allow the non-engineer to make an informed decision on further actions.

This document proposes a checklist that the non-engineer can use when receiving an electrical test certificate or report.

The factors to check include:

- Test certificates should only be completed by suitable qualified and competent persons. It is important that the competence and qualification of the tester and supervisor can be proven.
- Test certificate must be completed and signed; often the certificates are not signed and the person doing the testing cannot be held to account.
- All limitations and exceptions should be carefully read and the implication of the limitation needs to be considered. Any limitations imply an accepted risk by the building owner or persons commissioning the work
- Review and implement follow-up actions on the observations and recommendations identified in the reports. All observations and recommendations are classified. Items classified as C1 (Danger present) should immediately be corrected, items marked as FI (Further investigation) should be further investigated as the risk on these items are essentially passed back to the responsible person or building owner.
- A note should be made of the next inspection and testing date and appropriate planning done to ensure this work is carried out at the appropriate time in the future.

2 The BS7671 wiring regulations

There are different parts of the electrical system, High Voltage (building transformers and supplies to the transformers, electrical distribution within a building and portable appliance which are connected to the sockets in a building. This document refers to electrical certificates for a building, specifically those relating to the BS 7671 (IET Wiring Regulations) which sets the standards for electrical installation in the UK. This document and BS7671 do not cover portable appliance testing or High Voltage systems.

3 Electrical inspection and testing

On completion of electrical work electrical tests are required. The purpose of electrical testing is to confirm, so far as reasonably practicable, whether the electrical installation is in

a satisfactory condition. This information is recorded in an electrical test document. There are three electrical test documents identified in BS7671:

- New Electrical Installation certificate – this is issued for new installations or changes to circuit characteristics
- Minor works certificate – this is issued where work is done, but the circuit characteristics have not been changed
- Electrical Installation Condition Report – this is issued when a review of the existing electrical installation is done

4 Qualified persons, NICEIC, ECA

Each certificate is signed by the person or persons doing the testing. In signing the document, these persons make the following statement, the statement is qualified with exceptions:

“I/We, being the person(s) responsible for the inspection and testing of the electrical installation (as indicated by my/our signatures below), particulars of which are described above (see C), having exercised reasonable skill and care when carrying out the inspection and testing, hereby declare that the information in this report, including the observations (see F) and the attached schedules (see H), provides an accurate assessment of the condition of the electrical installation taking into account the stated extent of the installation and the limitations of the inspection and testing (see D). I/We further declare that in my/our judgement, the said installation was overall in Satisfactory/Unsatisfactory condition (see G) at the time the inspection was carried out, and that it should be further inspected as recommended (see I).”

Figure 1 Extract from an Electrical Condition Report

Before making this or a similar statement the person carrying out the testing needs to be a competent and qualified to make the statement. The responsibility for selecting a competent and qualified person lies with the person or organisation commissioning the work.

The competence of the electrical tester and supervisor can be determined by a competent person scheme; for example, The National Inspection Council for Electrical Installation Contracting (NICEIC) is one of several providers given Government approval to offer Competent Person Schemes to oversee electrical work within the electrical industry.

An accredited electrical contractor will have been assessed to ensure that they have been tested and approved on the latest legislation as well as checking that their working practices are of a consistently high standard.

4.1 Checklist

When commissioning works the following need to be verified:

1.	Is the contractor a member of a suitable competent person scheme for the work being carried out e.g. NICEIC
2.	Do the electrician and supervisor carrying out the have appropriate qualifications e.g. industry qualifications for inspection and testing wiring systems to BS 7671 such as City & Guilds 2391-52 Inspection & Testing Course

When appointing an electrician or electrical contractor both of the above need to be agreed and confirmed with the organisation providing the certificate.

5 Qualified person signs off the certificate

On completion of the certificate it should be signed off by the tester and qualifying supervisor.

E. DECLARATION			
<p>I/We, being the person(s) responsible for the inspection and testing of the electrical installation (as indicated by my/our signatures below), particulars of which are described above (see C), having exercised reasonable skill and care when carrying out the inspection and testing, hereby declare that the information in this report, including the observations (see F) and the attached schedules (see H), provides an accurate assessment of the condition of the electrical installation taking into account the stated extent of the installation and the limitations of the inspection and testing (see D).</p> <p>I/We further declare that in my/our judgement, the said installation was overall in Unsatisfactory condition (see G) at the time the inspection was carried out, and that it should be further inspected as recommended (see I).</p>			
INSPECTION, TESTING AND ASSESSMENT BY:		REPORT AUTHORISED FOR ISSUE BY:	
Signature:	Completion Authorised via email (michael.joubert@gmail.com) on 27/09/2018 07:35 AM	Signature:	Completion Authorised via email (michael.joubert@gmail.com) on 27/09/2018 07:35 AM
Name:	Michael Joubert	Name:	Michael Joubert
Position:	Administrator		(Qualifying Supervisor for contractor in section J - Details of contractor)
Date:	27/09/2018	Date:	27/09/2018

Figure 2- Declaration section

5.1 Checklist

After any electrical work has been completed a signed and completed certificate must be delivered to the building owner.

1.	Certificates must be appropriately signed off. If the certificate is not signed off there is no certification and the duty of care of the person commissioning the work or the building owner cannot be proven .
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6 Extent, Limitations and Agreement of limitations

When specifying and requesting electrical works limitations and exceptions may be agreed. It is not uncommon for additional limitations to be discovered during the testing work.

Before signing the certificate, the tester and supervisor will include limitations and exceptions in the certificate. The implications of the exemptions need to be understood and if acceptable agreed by the person commissioning the work. This is also important information for the Building Owner and responsible person. If the limitations are extensive it will impede the ability to make a satisfactory risk assessment on the electrical system condition.

Accepting limitations in the inspection effectively transfers the risk back to the building owner, e.g. if the limitation is not to test an area, then the risk associated with the electrical

system in that area is transferred to the building owner. Limitations need to be carefully considered.

To identify the limitations, the details of the described in the limitations section of the report and any limitations identified in the test results must be reviewed.

D. EXTENT OF THE INSTALLATION AND LIMITATIONS OF THE INSPECTION AND TESTING	
Extent of the electrical installation covered by this report: -	
Agreed limitations, including reasons (see Regulation 634.2). Agreed with: -	
Operational limitations including the reasons: -	
<p>The inspection and testing detailed in this report and accompanying schedules have been carried out in accordance with BS 7671:2008 (IET wiring regulations), as amended to Amendment No. 3 2015 . It should be noted that cables concealed within trunking and conduits under floors, in roof spaces, and generally within the fabric of the building or underground, have not been inspected unless specifically agreed between the client and inspector prior to the inspection. An inspection should be made within an accessible roof space housing other electrical equipment.</p> <p style="text-align: right;">Additional Comments and/or Risk Assessment attached: <input type="checkbox"/></p>	

Figure 3 Limitations identified in the certificate ‘Limitations’ section

Limitations may be summarised in the extent and limitations sections, however usually they appear in the test results. In example 1 below, the blank fields would be understood and accepted by another electrical engineer.

However, in example 2 below, the highlighted items could be open to question by an electrical engineer.

Very often these limitations are flagged as a LIM in the test results and assigned a Further Investigation code (FI). This effectively puts transfers the responsibility to the building owner or person commissioning the work to take further action or to the risk.

SCHEDULE OF TEST RESULTS FOR THE INSTALLATION

TO BE COMPLETED ONLY IF THE DISTRIBUTION BOARD IS NOT CONNECTED DIRECTLY TO THE ORIGIN OF THE INSTALLATION										TEST INSTRUMENTS (SERIAL NUMBERS) USED			
Z _s at DB	0.12	Ω	Operating times of associated RCD (if any)		At I _{Δn}		ms	Earth fault loop impedance	BV55/044	RCD	-		
I _{pn} at DB	3.2	kA			At 5I _{Δn} (if applicable)		ms	Insulation resistance	BV55/044	Other	-		
Distribution board designation:	DB 7 DB							Continuity	BV55/044	Other	-		
Correct Supply Polarity Confirmed:	<input checked="" type="checkbox"/>	Phase Sequence Confirmed:	<input checked="" type="checkbox"/>	Details of circuits and/or installed equipment vulnerable to damage when testing:			-	Next test date:	03/10/2023				
Circuit number and phase	Circuit impedances (Ω)					Insulation resistance Record lower or lowest value		Polarity (v)	Z _s (Ω)	RCD			Remarks
	Ring final Continuity [measured end to end] (Ω)			Continuity [at least one column to be completed] (Ω)		Live/Earth (MΩ)	Live/Earth (MΩ)			at I _{Δn} (ms)	at 5I _{Δn} (if applicable) (ms)	Test Button Operation (v)	
	r ₁ (Line)	r _n (Neutral)	r ₂ (cpc)	R ₁ +R ₂	R ₂								
1 L1	-	-	-	0.21	-	>299	>299	✓	0.33	-	-	-	-
1 L2	-	-	-	0.25	-	>299	>299	✓	0.37	-	-	-	-
1 L3	-	-	-	0.2	-	>299	>299	✓	0.32	-	-	-	-
2 L1	-	-	-	0.27	-	>299	>299	✓	0.39	-	-	-	-
2 L2	-	-	-	0.15	-	>299	>299	✓	0.27	-	-	-	-
2 L3	-	-	-	0.21	-	>299	>299	✓	0.33	-	-	-	-

Figure 4 Test results example 1 – with no limitations

SCHEDULE OF TEST RESULTS FOR THE INSTALLATION

Notification: The full list of circuits is not shown, only the circuits that have test results are shown in the circuit list.

TO BE COMPLETED ONLY IF THE DISTRIBUTION BOARD IS NOT CONNECTED DIRECTLY TO THE ORIGIN OF THE INSTALLATION						TEST INSTRUMENTS (SERIAL NUMBERS) USED			
Z _s at DB	0 Ω	Operating times of associated RCD (if any)	At I _{Δn}	ms	Earth fault loop impedance	04-002	RCD	95-675	
I _{pr} at DB	0 kA	(if any)	At 5I _{Δn}	ms	Insulation resistance	01-022	Other	12-016	
Distribution board designation:	737 DB		(if applicable)		Continuity	01-022	Other	N/A	
Correct Supply Polarity Confirmed:	-	Phase Sequence Confirmed:	-	Details of circuits and/or installed equipment vulnerable to damage when testing:				Next test date: 08/06/2021	

Circuit number and phase	Circuit impedances (Ω)					Insulation resistance Record lower or lowest value		Polarity (V)	Z _s (Ω)	RCD			Remarks
	Ring final Continuity [measured end to end] (Ω)		Continuity [at least one column to be completed] (Ω)			L _{live} /Live (MΩ)	E _{live} /Earth (MΩ)			at I _{Δn} (ms)	at 5I _{Δn} (if applicable) (ms)	Test Button Operation (V)	
	r ₁ (Line)	r _n (Neutral)	r ₂ (cpc)	R ₁ +R ₂	R ₂								
1 Y	-	-	-	-	-	>299	>299	-	-	-	-	-	-
2 Y	-	-	-	-	-	>299	>299	-	-	-	-	-	-
3 Y	-	-	-	-	-	>299	>299	-	-	-	-	-	-
4 Y	-	-	-	LIM	-	>299	>299	-	LIM	-	-	-	CANNOT LOCATE - NO ID - FI
5 Y	-	-	-	LIM	-	>299	>299	-	LIM	-	-	-	CANNOT LOCATE - NO ID - FI

Figure 5 Test results example 2 – test results with limitations

6.1 Checklist

1	Check to see that the any limitations stated are in line with the original intention and requirements stated in the scope of work
2	Any variations or exceptions should be risk assessed and an appropriate mitigation provided
3	All limitations identified in the test results should be included in the observations and recommendations list in the certificate

7 Summary of inspection

For Electrical Inspection Condition Reports the Summary of Inspection (Section G) provides a statement on the outcome of the testing.

G. SUMMARY OF THE INSPECTION	
General condition of the installation (in terms of electrical safety):	
-	
Date of the inspection:	14/09/2018 Overall assessment of the installation in terms of its suitability for continued use: Unsatisfactory

7.1 Checklist

The result of the assessment must be reviewed by the owner of the building (responsible person). If a condition report summary indicates the overall assessment is Unsatisfactory, there will be observations and recommendations listed in the certificate, the building owner needs to review the recommendations. Any actions identified should be risk assessed and remediated as required.

1	Is the overall assessment satisfactory?
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8 Observations, recommendations and action required

F. OBSERVATIONS AND RECOMMENDATIONS FOR ACTIONS TO BE TAKEN		Board/Cct reference	Classification Code
Referring to the attached schedules of inspection and test results, and subject to the limitations at D: (The items in this section provide observations and recommendations for remedial actions.)			
Item No			

GENERAL OBSERVATIONS

1	RCD External Test Faults: Unit 18 Kitchen The socket outlet is located too close to sink area. The socket outlet should be relocated at a recommended distance of not less than 300mm from the sink area in accordance with regulation 522.3.1	C2
2	External socket test Faults: Unit 18 Kitchen The insecurely mounted socket outlet should be secured in accordance with regulation 134.1.1	C3
3	External Lighting Faults: Unit 18 Warehouse Entrance A suitable 400 Volt warning sign should be attached to the light switch enclosure detailing the presence of 400V in accordance with regulation 514.10.1.	C3
4	Internal Faults: Unit 18 DB04 Kitchen. The enclosure has wiring colours to two versions of BS7671. A suitable warning notice should be attached in accordance with regulation 514.14.1	C3
5	Internal Faults: Unit 18 DB04 Kitchen. The Circuit protective and neutral conductors within the enclosure are not circuit identified. The conductors should be identified in accordance with regulation 514.1.2	C3
6	Circuits Faults: Unit 18 DB04 Kitchen. There are protective devices protecting multiple circuits in ways 07L2. Each circuit should be protected by its own circuit protective device in accordance with regulation 314.4	C3
7	Internal Faults: Unit 18 DB04 Kitchen. The missing phase barriers from the enclosure should be replaced in accordance with regulation 416.2.3.	C3
8	Lighting Faults: Unit 18 General Throughout All Switches. The switch wire in the light switch should be suitably identified in accordance with regulation 514.3.1	C3

Example of Observations and recommendations

The codes relating to the observations are shown below. The table also provides explanation and a duty of care recommendation.

CODE (Description) (reference 1 below)	Notes and Use of the Code
Code C1 (Danger present. Risk of injury. Immediate remedial action required)	The duty holder should take action to address the issue immediately. Any observation given a code C1 classification should result in the overall condition of the installation being reported as unsatisfactory.
Code C2 (Potentially dangerous-urgent remedial action required)	The person ordering the report should be advised that remedial action should be taken to avoid the risk of a future incident. Any observation given a code C2 classification should result in the overall condition of the installation being reported as unsatisfactory.
Code C3 (Improvement recommended)	There is no immediate risk or danger, an improvement will enhance the safety of the installation. A code C3, in itself, should not warrant an overall unsatisfactory report <i>refer 3 below</i>).
Code FI (Further investigation required)	Further investigation is required if there is a reasonable expectation that there is a dangerous or potentially dangerous situation.

Code FIO (For information only)	THE FIO, For information only code is provided as a convenience for the testers in case they want to make a note or statement that will assist the client at some future date.
Code NCFE (Non-conformance found and fixed)	The NCFE code provides an indication that the item has been made safe.
Code N/V (Not Verified)	If the inspection of some equipment cannot be done.
Code LIM (Limitation)	If the Extent of the installation and limitations of the inspection and testing, excludes an area, inspection or test, then the LIM code may be applied.
Code N/A -Not Applicable.	In a pre-defined Schedule of Inspections, if an inspection item is not applicable, the N/A code should be used.

Table - Classification codes for observations and recommendations

References:

1- BS 7671:2008, 17th Edition, incorporating Amendment 3:2015, Notes on the Model Forms

2-Electrical Safety First, Best practice guide 4 (Issue 4)

3- IET Wiring Matters | Winter 11

2011_41_winter_wiring_matters_Observation_codes.pdf

8.1 Check list

1	Confirm that there are no items classified as C1's listed on the Observations sheet
2	Review the item classified as FI's and commission a risk assessment to understand the risk of not doing further work
3	Review LIM's in the test results and ensure that the reason for the LIM is included in the Observations and Recommendations.
Note	C2 items will required appropriate remedial work C3 items and other items, FIO, NCFE can be closed.

9 Next inspection date

A note should be made of the next inspection and testing date and appropriate planning done to ensure this work is carried out at the appropriate time in the future

10 Summary

This document has identified items to be checked when a non-technical person is reviewing an electrical certificate – it provides checks that will identify common issues in electrical certificates. The detailed checklists are in the above text, a short summary is provided below:

- 1) Selecting a proven qualified and competent electrical installer and tester is a key duty of care for the person commissioning the work
- 2) The scope of the installation and testing work needs to be clearly defined and the risk of agreed limitations needs to be understood and appropriately remediated.
- 3) Key sections of any electrical report need to be critically reviewed:
 - Purpose of the report: Does this meet the specified requirement
 - Limitations: Have these been agreed and what is the impact on the risk assessment of the safety of the electrical system
 - Contractor accreditation: Is the organisation suitably accredited
 - Qualification of the electrician and supervisor signing the report: Are the supervisors and testers suitably qualified
 - Certificate sign-off: has the certificate been completed and signed
 - Overall assessment: Is it satisfactory or un-satisfactory
 - Observations and recommendations: Are there any C1's that require immediate remediation and are the FI's appropriate
 - Have the tests been carried out as expected: Have limitations been recorded in place of test measurement values.
- 4) If a suitable and proven competent person completes the testing; and the limitations are reasonable and acceptable; and the installation is deemed satisfactory: The certificate can be accepted.
- 5) If the report is deemed un-satisfactory – then remedial work will be required on the items identified in the observations and recommendations list.
- 6) Put the appropriate plan in place for the next inspection and testing for the premises

11 Conclusion

This document provides key checks that can be made when a non-technical person is reviewing an electrical certificate; it does not replace or supersede the reviewed and judgment or opinion of a suitably qualified electrical engineer.

12 APPENDIX – Full description of observation codes

CODE (Description) (reference 1 below)	Notes and Use of the Code
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<p>Code C1 (Danger present. Risk of injury. Immediate remedial action required)</p>	<p>Code 1 faults should be addressed as soon as they are found.</p> <p>Danger exists and the persons using the installation are at immediate risk. Immediate action is required and the person that has requested the report should be immediately informed verbally and in writing, a detailed risk assessment should be provided of the problem. If possible, immediately, dangerous situations should be made safe or rectified before further work or inspections are carried out. The duty holder should take action to address the issue immediately.</p> <p>Code C1 examples: accessible live conductors due to damage, poorly modified enclosures or removed maintenance panels. It should be noted that incorrect polarity would also attract a code C1 as it may allow conductive parts, not normally expected to be live, to become live (<i>refer 3 below</i>).</p> <p>Any observation given a code C1 classification should result in the overall condition of the installation being reported as unsatisfactory.</p>
<p>Code C2 (Potentially dangerous-urgent remedial action required)</p>	<p>The person ordering the report should be advised that remedial action should be taken to avoid the risk of a future incident.</p> <p>The phrase “potentially dangerous”, is designed to point towards a risk of injury from contact with live parts after a sequence of events. A sequence of events could mean that an individual would need to move, open or gain access to live parts through a day to day task that would not be expected to give access to live parts, for example: If an isolator in a locked cupboard had a damaged casing, leaving exposed live parts that could not be accessed without the use of access equipment, such as a specialist tool or key this would be considered a code C2 (<i>reference 3 below</i>)</p> <p>Any observation given a code C2 classification should result in the overall condition of the installation being reported as unsatisfactory.</p>
<p>Code C3 (Improvement recommended)</p>	<p>There is no immediate risk or danger, an improvement will enhance the safety of the installation.</p> <p>The code C3 implies that the installation is not necessarily dangerous, but it may not comply with the current version of the regulations or for example, may have damaged fittings</p>

	that do not have exposed live parts. A code C3, in itself, should not warrant an overall unsatisfactory report <i>refer 3 below</i>).
Code FI (Further investigation required)	<p>Further investigation is required if there is a reasonable expectation that there is a dangerous or potentially dangerous situation.</p> <p>Note 9 of the notes for the person producing the report has been revised with regard to where the inspection has revealed an apparent deficiency that could not be fully identified due to the extent or limitations of the inspection. The note points out that if a further investigation may reveal that the deficiency warrants the award of classification code C1 (Danger present) or C2 (Potentially dangerous), a recommendation of further investigation required (Code FI) should be recorded at Section K (Observations). It should be appreciated, however, that an FI classification should not be recorded if the investigation could only be expected to lead, at worst, to the award of C3 classification (Improvement recommended) in relation to the observation.</p>
Code FIO (For information only)	THE FIO, For information only code is provided as a convenience for the testers in case they want to make a note or statement that will assist the client at some future date.
Code NCF (Non-conformance found and fixed)	If a Code C1 (Danger present. Risk of injury. Immediate remedial action required) is found, it should be attended to immediately. If it is attended, the NCF code provides an indication that the item has been made safe.
Code N/V (Not Verified)	If the inspection of some equipment cannot be done, and no Further Investigation is required, then a N/V code is appropriate. FI is only required if a dangerous situation is reasonably expected , if not, then a Not Verified code is warranted. The N/V code is usually only used where there is a defined schedule of items to be inspected, i.e. where there is a pre-defined set of questions in the Inspection Schedule.
Code LIM (Limitation)	<p>If the condition report section D. Extent of the installation and limitations of the inspection and testing, excludes an inspection or test, then the LIM code can be applied.</p> <p>The LIM code also indicates a limited inspection or test where the section D does expect a test or inspection to take place.</p>

	The reason for the LIM should be clearly stated in the observation and recommendation text.
Code N/A -Not Applicable.	In a pre-defined Schedule of Inspections, if an inspection item is not applicable, the N/A code should be used.