

Presentation
to the
Association of Irish Risk Management

Camden Court Hotel
16 January 2013

1. RECI overview
2. Standards, controlled works and wiring rules
3. Protection devices and consumer unit
4. Visual inspection check list and tests
5. Test record sheets
6. Examples of damaged electrical installations
7. Statistics
8. Certificates
9. Periodic inspection report

History

- In 1970s & 80s various committees looked at the question of a roll of approved electrical contractors.
- RECI was officially launched in April 1992. Founding organisations were ESB, ETCI, AECL, and ECA. Each of these is entitled to nominate up to two directors to the board. In addition two directors were elected by independent contractors. This was a self regulatory model.
- The Energy (Misc Provisions) Act 2006, granted the Commission for Energy Regulation (CER) powers in relation to electrical safety. CER consulted concerning as to how best the scheme for the regulation of electrical contractors should be operated.

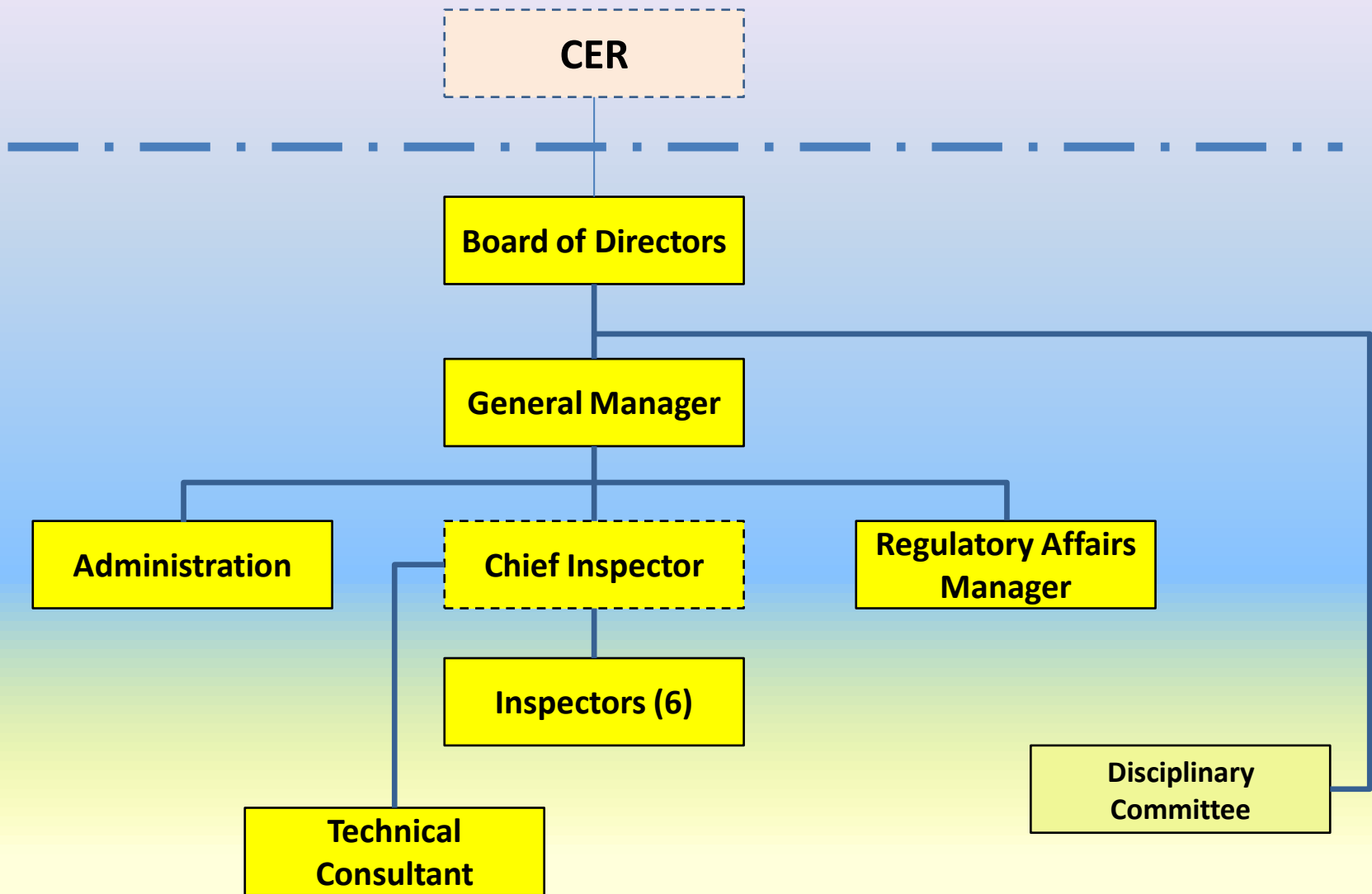
History

- Resulted in the publication of the Criteria Document in 2008. This sets out the detailed rules and obligations for participants operating within the electrical safety regulatory scheme.
- In late 2008 the CER appointed two bodies to act as electrical Safety Supervisory Bodies (SSBs) and to carry out the day to day operation of the scheme. RECI & ECSSA
- Both SSBs appointed for a period of seven years from 5th January 2009.

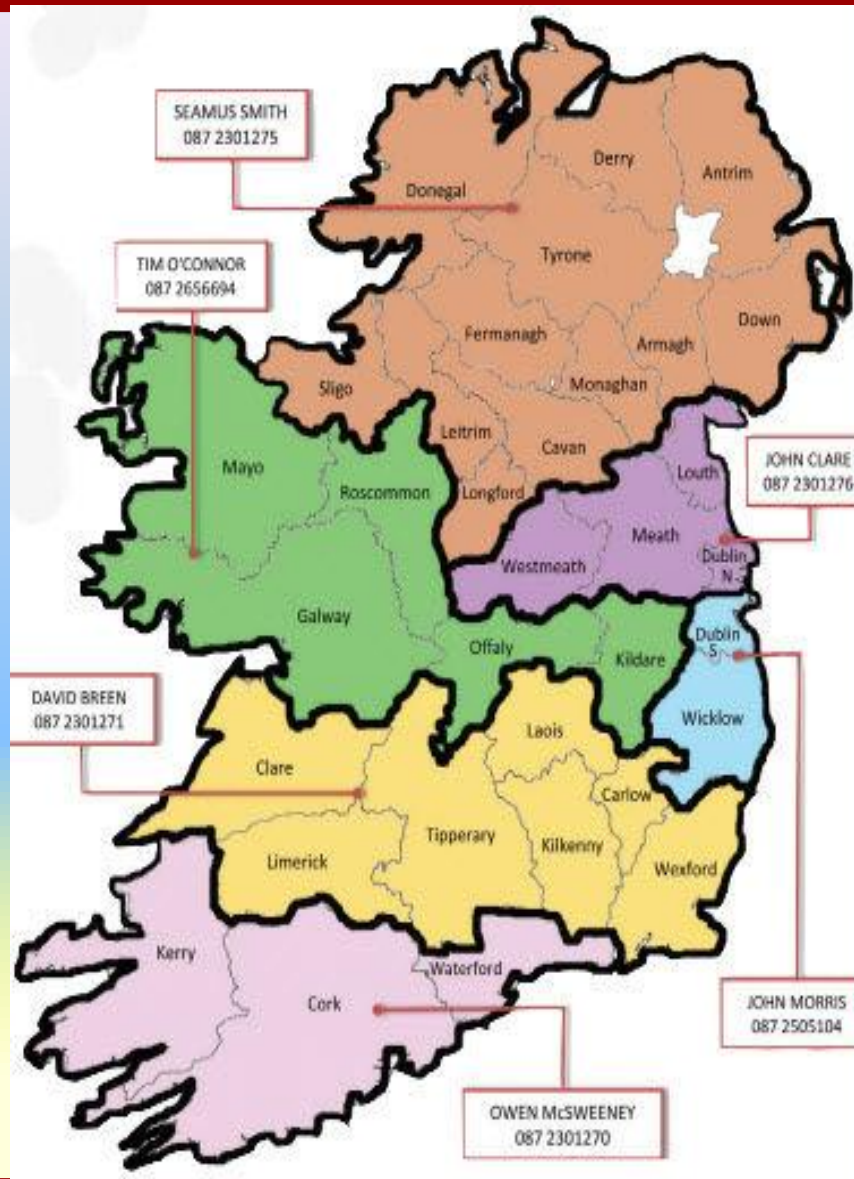
Register of Electrical Contractors of Ireland

- We regulate Registered Electrical Contractors (RECs) with regard to electrical safety – we do not get involved in commercial aspects.
- We ensure that they are competent and attain all of the required criteria as set out in the CER Criteria Document under the rules of the scheme e.g. insurance.
- We audit & inspect RECs on a regular basis.
- We are responsible for dealing with complaints concerning RECs.

1/4 – RECI Overview - Organisation



1/5 - Inspectors



2/1 - Electrical Installation Standards

- 1967: First Irish Wiring Rules
- 1972: E.T.C.I formed
  - National Rules for Electrical Installations Published ET101
- Harmonisation of European Wiring Rules CENELEC
- Fourth edition of ET101 out in 2008
- Amendment 1 published in 2011
- TC2 monthly meetings

2/2 - Controlled Works - Definition

Controlled Works are major electrical works (incl. additions, alterations and /or extensions) which are covered by the National Wiring Rules and which involve:

1. The installation, commissioning, inspection and testing of a new fixed electrical installation requiring connection or reconnection to the electricity network;
2. The installation or replacement of a Distribution Board or Consumer Unit, or new installation in special locations as defined in Part 7 of the National Wiring Rules ET101 and ET105;
3. The installation or replacement of one or more circuits in an existing installation, including the installation of one or more additional protective devices for such circuits on a distribution board;
4. Subsystems installed in Commercial, Industrial, and Domestic installations where the installation falls within the remit of the National Wiring Rules;

2/3 - Controlled Works - Definition

5. The inspection, testing and certification of existing electrical installations (in accordance with Chapter 62 of the Wiring Rules (ET101 – 4th Edition – 2008 and to conform with Regulation 89 of SI Mo 732 of 2007)

Any works which do not fall within the above scope are not Controlled Works and shall not necessarily require a Completion Certificate to issue. However it is recommended that for all other works an appropriate form of certification is used (for example a Declaration of Compliance with ET 101 for Minor Works where appropriate). Furthermore all entries on the Completion Certificate or Declaration of Compliance should be filled in by the installing electrical contractor.

Contents

- Part 1: Scope, object and fundamental principles
- Part 2: Definitions
- Part 3: General Characteristics
- Part 4: Protection for safety
- Part 5: Selection and erection of equipment
- Part 6: Verification & Certification
- Part 7: Requirements for special installations or locations
- Annexes

- **Part 1: Scope, object and fundamental principles**

- Scope

- Specify the requirements for the design, erection and proper functioning of electrical installations
    - Intended to provide for the safety of persons, livestock and property against dangers and damage that may arise in the reasonable use of electrical installations.

- Object

Specify the requirements for the design, erection and testing of electrical installations so as to provide safe and proper functioning for their intended use.

- Fundamental principles

Are intended to ensure the safety of persons, livestock and property against dangers and damage that may arise in the reasonable use of electrical installations.

- **Part 3: General characteristics**
  - Chapter 30: Assessment of general characteristics
  - Chapter 31: Purposes, supplies and structure of installation
    - 311: Maximum demand and diversity
    - 312: Supply conductor arrangement and system earthing
    - 313: Supplies
    - 314: Arrangement of circuits
  - Chapter 32: Classification of external influences
  - Chapter 33: Compatibility
  - Chapter 34: Maintenance
  - Chapter 35: Safety services
  - Chapter 36: Continuity of service
  - Chapter 37: Voltage bands

- **Part 4: Protective measures for safety**
  - Chapter 40: Application of protective measures
  - Chapter 41: Protection against electric shock
  - Chapter 42: Protection against fire and harmful thermal effects
  - Chapter 43: Protection against overcurrent
  - Chapter 44: Protection against voltage disturbances and electromagnetic disturbances
  - Chapter 46: Isolation and switching

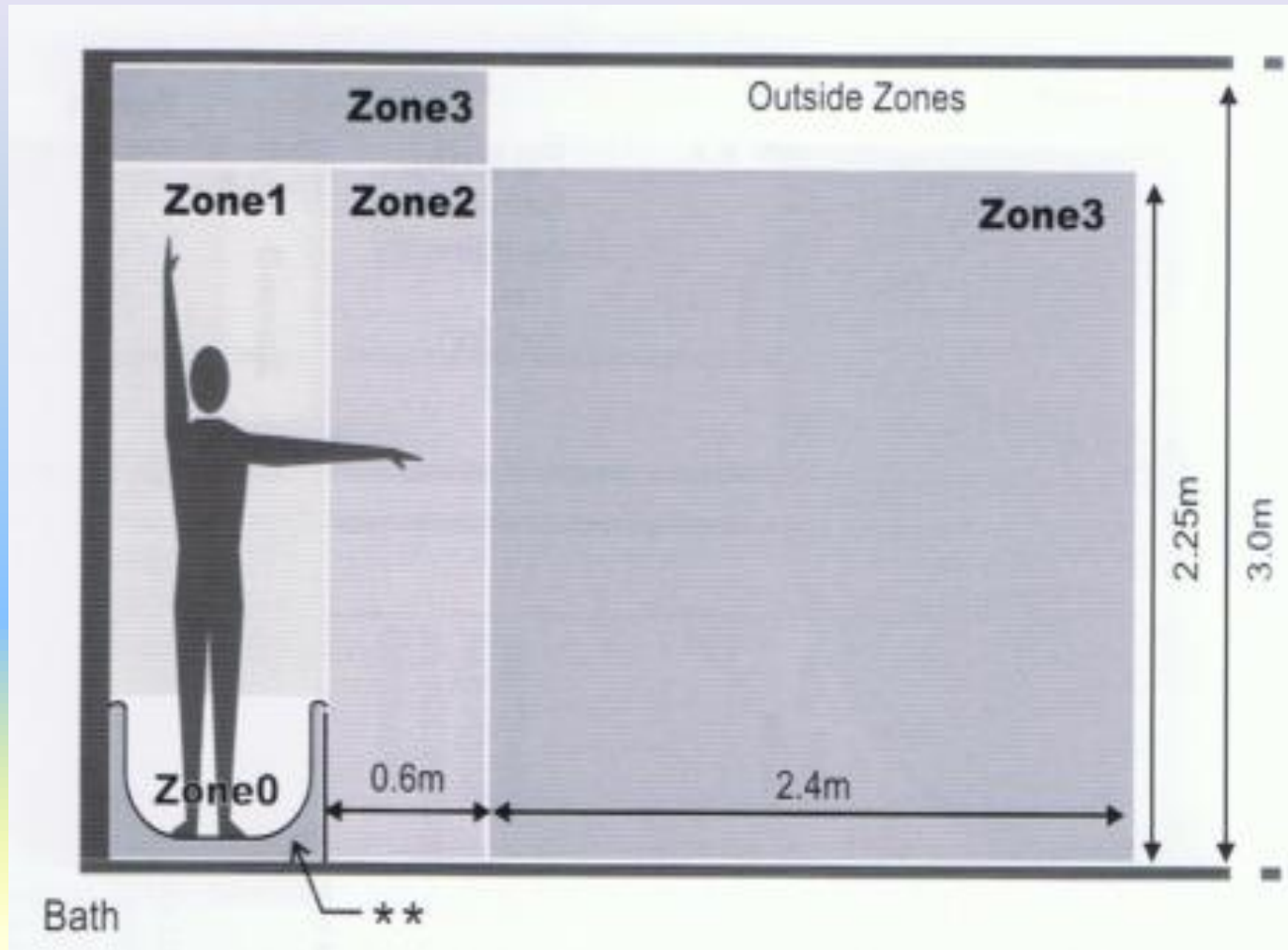
- **Part 5: Selection and erection of equipment**
  - Chapter 51: common rules and external influences
  - Chapter 52: Wiring systems
  - Chapter 53: Equipment for protection, isolation, switching control and monitoring
  - Chapter 54: Earthing arrangements, protective conductor and equipotential bonding
  - Chapter 55: Other equipment
  - Chapter 56: Safety services

- **Part 6: Verification and certification (1)**
  - Chapter 61: Initial verification
    - 612: Inspection
    - 613: testing
      - 613.2: Continuity of conductors
      - 613.3: Insulation resistance of electrical installation
      - 613.4: Detection of erroneous connection Between circuits
      - 613.5: Protection by SELV, PELV or electrical separation
      - 613.6: Verification of conditions for protection by automatic disconnection of supply including earthing and equipotential bonding
      - 613.7: Floor and wall insulation resistance
      - 613.8: Polarity verification and test
      - 613.9: Phase-sequence and motor rotation check
      - 613.10: Voltage drop
      - 613.11: Electric strength tests for site-built assemblies
      - 613.12: Functional tests
      - 613.13: Fault-loop impedance measurement
      - 613.14: Verification of operation of RCDs

- **Part 6: Verification and certification (2)**
  - Chapter 62: Periodic inspection and testing
    - 62.1: Scope
    - 62.2: Procedure
    - 62.3: Recommendations for remedial work
  - Chapter 63: Certification
    - 63.2: Initial inspection and testing
    - 63.3: Interim certificate for a fully completed section of an electrical installation
    - 63.4: Certification procedure for electrical installations
    - 63.5: Procedures for sub-system completion certificates

- **Part 7: Requirements for special installations or locations (1)**
  - 701: Location containing a bath or shower basin (includes classification of zones)
  - 702: Swimming pools and padding pools
  - 703: Location containing a hot air sauna heater
  - 704: Construction and demolition site installation
  - 705: Agricultural and horticultural premises
  - 706: Conducting locations with restricted movement
  - 708: Caravan parks and similar locations
  - 709: Marinas and similar locations
  - 710: Medical locations
  - 711: Exhibitions, shows and stands
  - 712: Solar Photovoltaic (PV) power supply systems

2/11a – Classification of zones



- **Part 7: Requirements for special installations or locations (2)**
  - 714: Outdoor lighting installations
  - 715: Extra-low voltage lighting installations
  - 717: Mobile or transportable units
  - 721: Caravans and motor caravans
  - 729: Operating or maintenance gangways
  - 740: Temporary installations for structures, amusement devices and booths at fairgrounds, amusement parks and circuses
  - 753: Floor and ceiling heating systems

- **Annexes (1)**

- 41A: Measures for basic protection against electric shock (protection against direct contact)
- 41B: 41A: Measures for basic protection against electric shock (protection against direct contact) in certain types of location in accordance with sub-clause 410.2.4
- 41C: Special measures for protection in case of a fault for application only where the installation is controlled or under supervision by authorised persons
- 43A: Protection of conductors in parallel against overcurrent
- 51A: Statutory regulations concerning electrical equipment and installations
- 51B: Recommended graphical symbols
- 51C: IP classification system for enclosures

- **Annexes (2)**

- 51D: Classification systems for external influence
- 51E: The identification of cores in multi-core cable
- 52A: Cable capacities of conduit and trunking
- 52B: Recommendations for cable-bending radii and cable support spacing
- 52C: Current-carrying capacities for insulated conductors and cables
- 52D: standard cable types available on the Irish market
- 52E: Voltage drop values for cable with copper conductors
- 52F: Summary of the rules for wiring concealed in walls or partitions
- 53A: Residual current protective devices (RCD)
- 53B: Protection of meter tails
- 54A: minimum sizes for earth electrodes
- 54B: Method for deriving the factor **k**
- 54C: Recommendation for the earthing of IT installations
- 55A: Final circuit arrangements

- **Annexes (3)**

- 61A: Visual inspection
- 61B: Verification of continuity of conductors
- 61C: Determination of fault-loop impedance by calculation with measurement of resistance of the protective conductor
- 61D: Measurement of earth electrode resistance
- 61E: Measurement of the insulation resistance of floors and walls
- 61F: Measurement of earth-fault loop impedance of circuits
- 61G: Verification of operation of RCDs
- 62A: Periodic inspection report form
- 63A: Specimen of completion certificates in accordance with chapter 63
- 63B: Guidelines for certification for alterations to existing installations

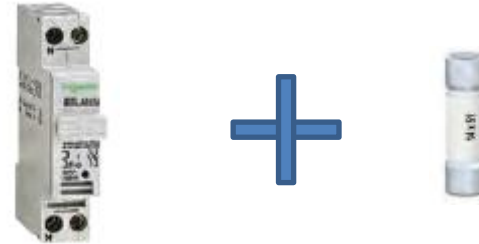
- **Annexes (4)**

- 705A: Equipotential bonding in cattle sheds and milking parlours
- 705B: Installation of electrical devices
- 710A: Classification of safety services for medical locations
- 710B: Examples of group numbers and classification for safety services of medical locations
- 721A: Example of notice mounted in a caravan
- 753A: Floor and ceiling heating systems

- **MCB** (Miniature Circuit Breaker)
- **RCD** (Residual Current Device)
- **RCBO** (Residual Current Circuit Breaker with Overload Protection)



- **Fuses**



- **Surge Arrestors**



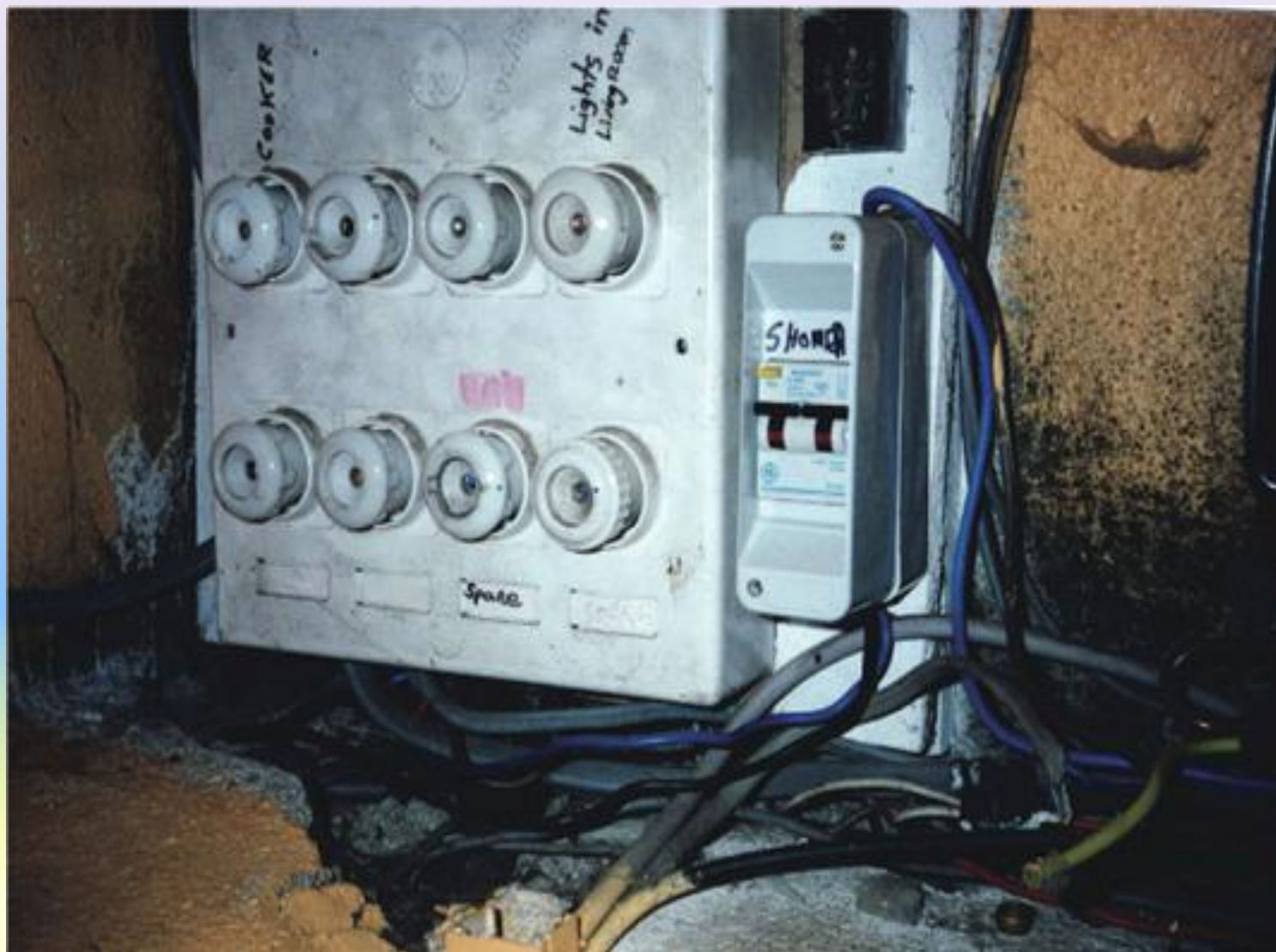
3/3 – Modern Consumer Unit – 1 Row



3/4 – Modern Consumer Unit – 2 Rows



3/5 – Old Fuse Board



4/1 – Visual inspection check list

- General
- Protection against direct contact
- Fixed wiring
- Protective, earthing and bonding conductors
- Accessories (general)
- Socket-outlets
- Switches and combined switch-fuse units
- Joint boxes
- Cooker control unit
- Conduit and trunking
- Lighting
- Distribution boards

A. Pre-connection tests

1. Continuity of protective conductors and of main and supplementary bonding conductors.(613.2.1 and Annex 61B)
2. Continuity of conductors in ring final circuits, where applicable. (613.2.2)
3. Maximum resistance of protective conductor. (Annex 61C)
4. Insulation resistance.(613.3) (Table 61A)
5. Verification of protection by separation of circuits, where applicable. (613.5.3)
6. Detection of Erroneous Connections (613.4)
7. Polarity.(613.8)

B. Post-connection tests

8. Line to earth fault loop impedance.(613.13 and Table A61C.1 or A61c.2)
9. Verification of operation of residual current devices (RCDs).(613.14 and Annex 61G)

Note

If an installation should fail a test, that test and any preceding tests that may have been influenced by the fault indicated shall be repeated after the fault has been rectified.

- Purpose is to verify that:
  - Protective and bonding conductors are electrically sound, correctly connected and continuous throughout their length
  - All items of equipment and accessories are properly connected to the protective conductors
  - All bonding clamps are making good contact
- Test methods:
  - **Method A** is useful for verification of continuity of protective conductors in medium to large installations where the use of a wander lead (as in method b) would be impractical. This method applies to protective conductors only, it is not suitable for verification of continuity of bonding conductors.
  - **Method B** incorporating the use of a wander lead is used for verification of bonding conductors and it can also be used for verification of protective conductors in smaller installations.

4/5 - Test 1 – Example Method A

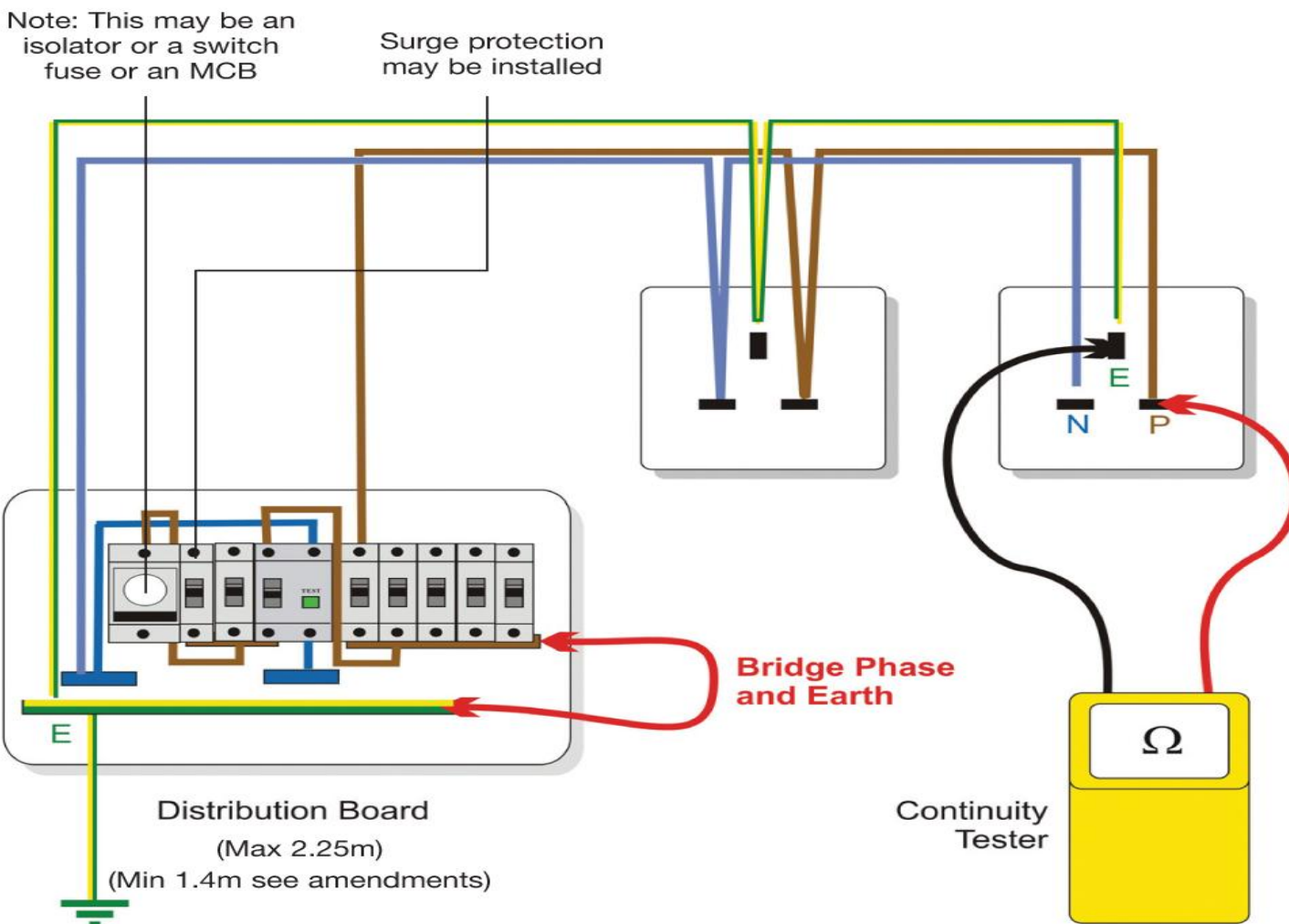


**Fig. 1 Continuity of Protective Conductor
Method A
(Annex 61B)**

- The purpose of this test is to verify continuity of all conductors in each ring circuit. If this test is overlooked or not carried out effectively the following serious hazards could remain undetected:
  - Overloading of circuit conductors arising from an open circuit in phase or neutral at some point in the ring.
  - A circuit remaining live when the circuit MCB is in the off position. This would arise if each end of a ring phase conductor were connected to different MCBs.

4/7 - Test 2 – Straight method

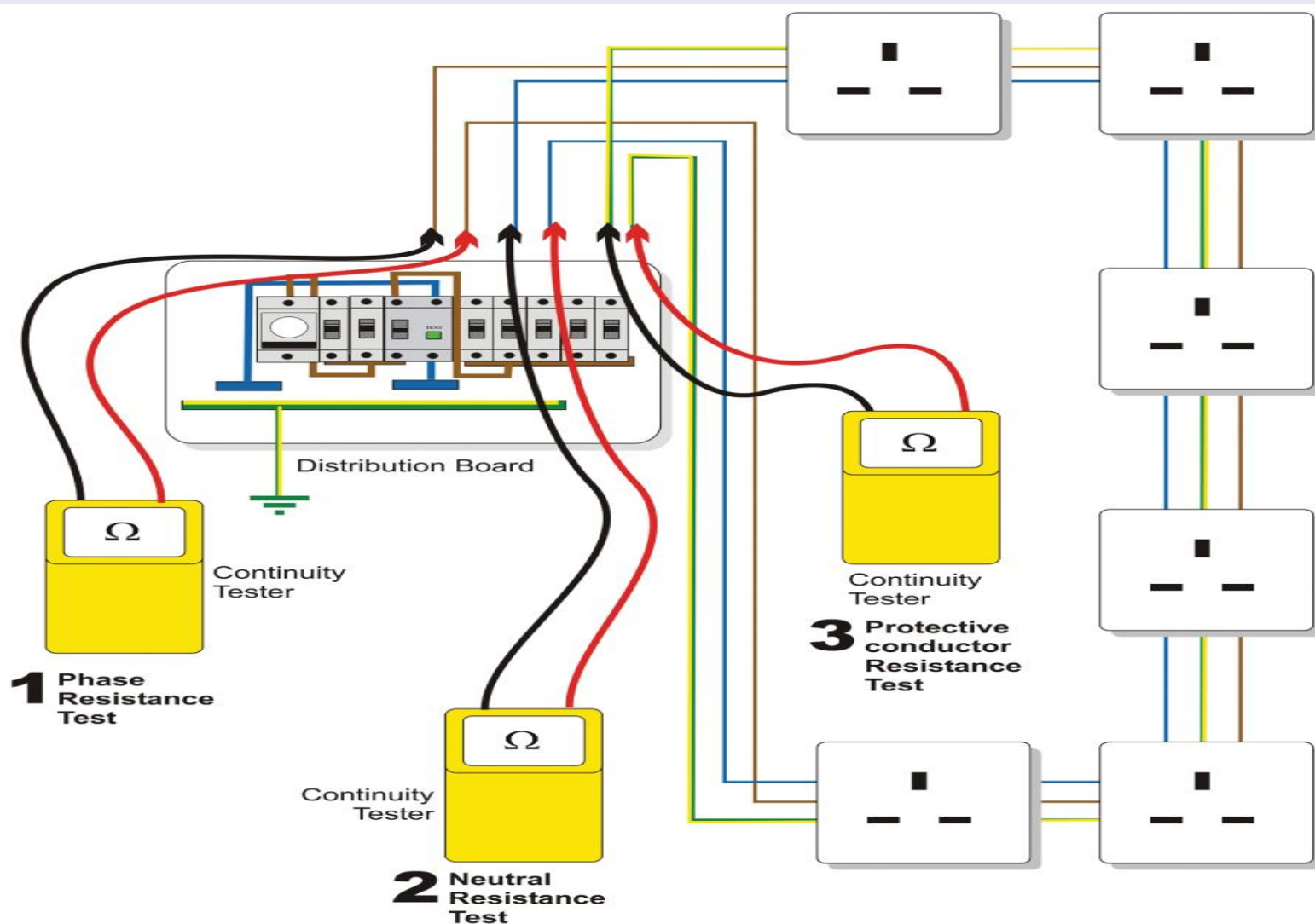


Fig. 6 Continuity of Ring-Circuit Conductors Straight Method

4/8 - Test 2 – Crossed Phase/Neutral

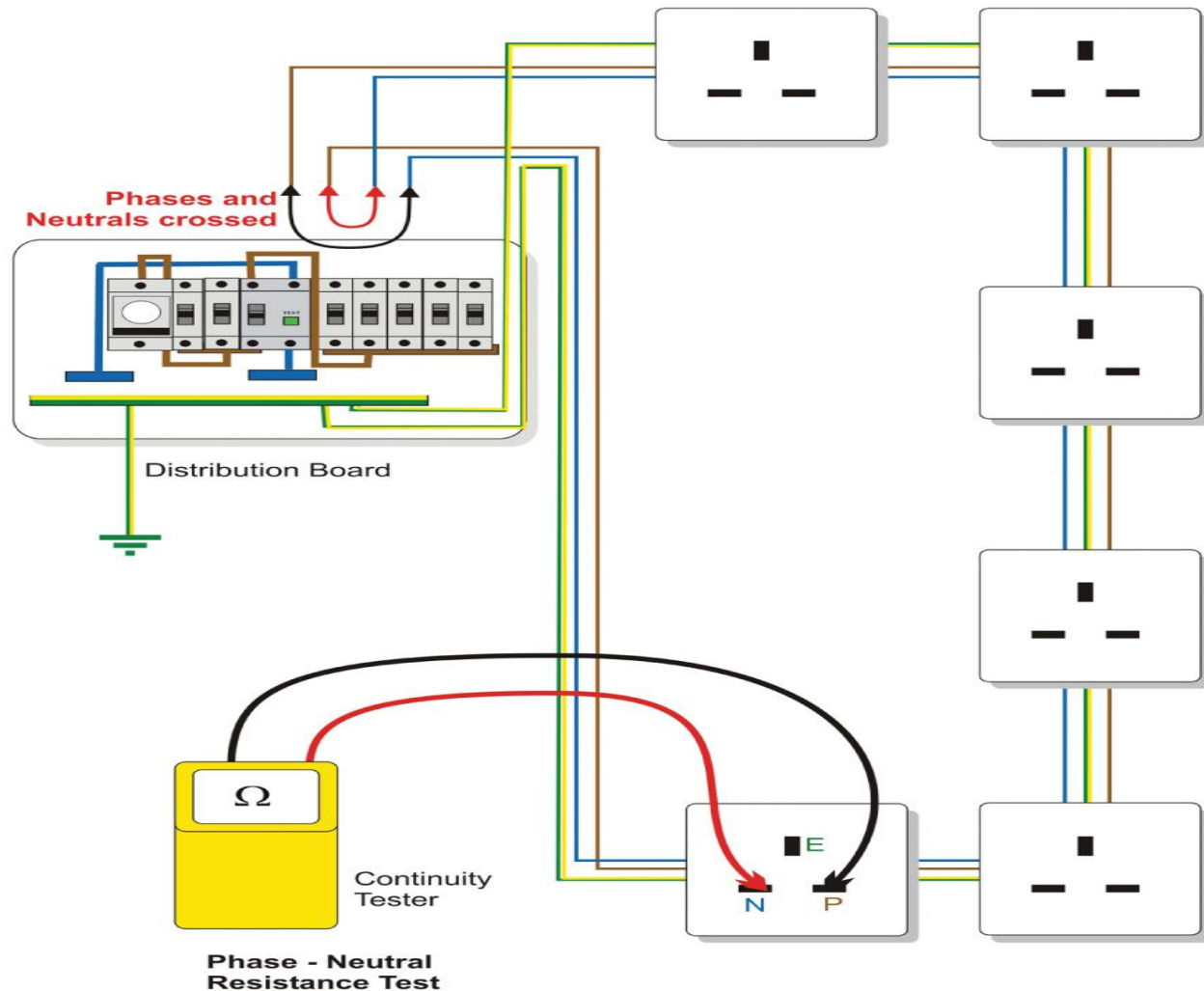


Fig. 7 Continuity of Ring-Circuit Conductors Crossed Phase/Neutral

- The purpose of this test is to ensure that resistance of the protective conductors is sufficiently low to allow protective devices to operate effectively in the event of an earth fault.
- The maximum measured value is the one to be quoted in test record sheets and completion certificates against “max resistance of protective conductor”.
- This test is usually combined with test 1 – continuity of protective and bonding conductors using either of the two methods already described

- Insulation resistance tests are required to verify that the installation does not contain short circuits and that insulation resistance values comply with the minimum values set down in Table 61A of the national wiring rules.
- Effective insulation is essential to provide protection against direct contact in addition to protecting against short circuits and earth faults.
- Insulation resistance tests will verify satisfactory insulation in a new installation or indicate such factors as dampness or the deterioration of insulation with associated fire risk in an existing installation.

Table 61A: Minimum Values of Insulation Resistance

Nominal Circuit Voltage a.c.	Test Voltage V d.c.	Insulation Resistance M Ω
SELV PELV	250	≥ 0.5
$> \text{ELV} \leq 500\text{V inc FELV}$	500	≥ 1.0
Above 500V	1000	≥ 1.0

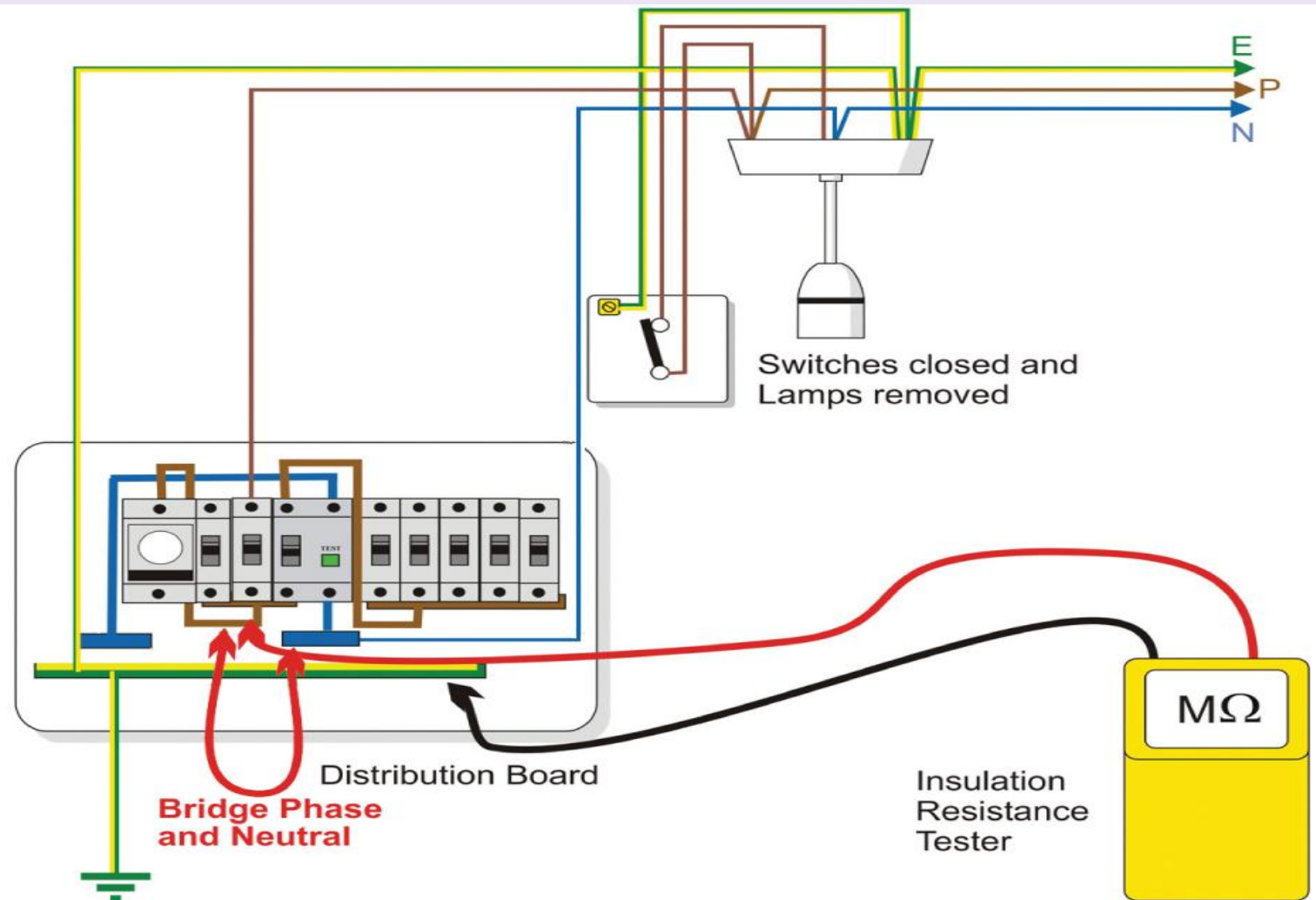


Fig. 8 Insulation Resistance between all Live Conductors connected together and the Protective Conductor

4/12 - Test 4 – Insulation resistance between live conductors

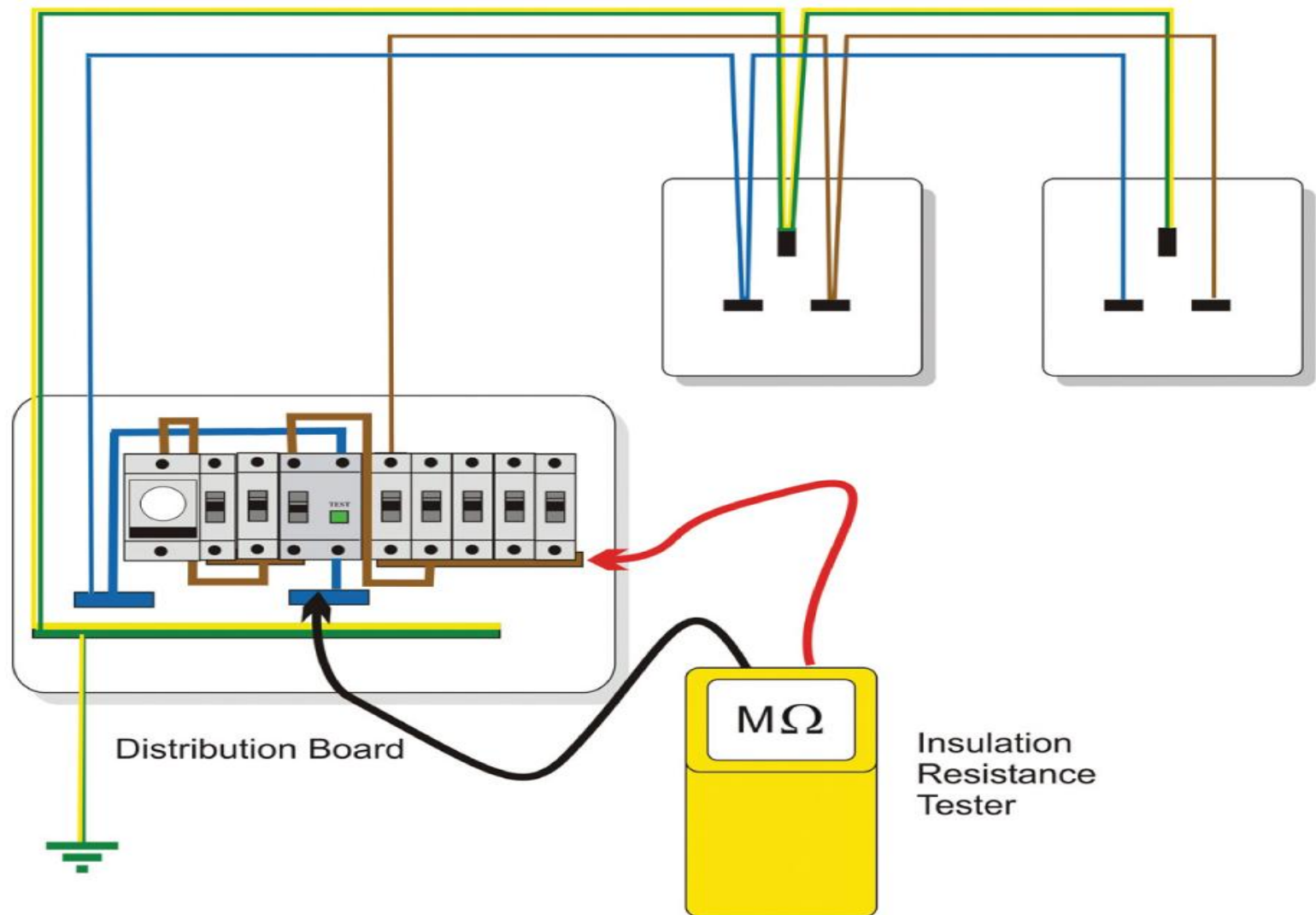


Fig. 9 Insulation Resistance Test between all Live Conductors

Where an installation incorporates protection against electric shock by separation of circuits an insulation test may be required to verify the necessary separation. These tests are not necessary if the separated circuits and other circuits are physically separated from each other throughout their length.

- **Protection by selv (separated extra-low voltage)**

An selv circuit operates at a voltage not exceeding 50V ac or 120V DC and is separated from circuits of higher voltage and from earth.

To verify the required separation an insulation resistance measurement is taken between the live conductors of each selv circuit connected together and the conductors of any adjacent higher voltage system connected together.

The test is carried out using an insulation resistance meter set as specified in Table 61A.

- **Protection by pelv (protective extra-low voltage)**

A pelv circuit operates at a voltage not exceeding 50V ac or 120V dc and is separated from circuits of higher voltage. One point in the circuit is connected to earth.

The test is carried out as for selv circuits except that testing between circuits and earth is not required.

- **Protection by electrical separation**

This protective measure requires that the circuit be separated from other circuits and from earth. It has limited application and requires a high level of maintenance.

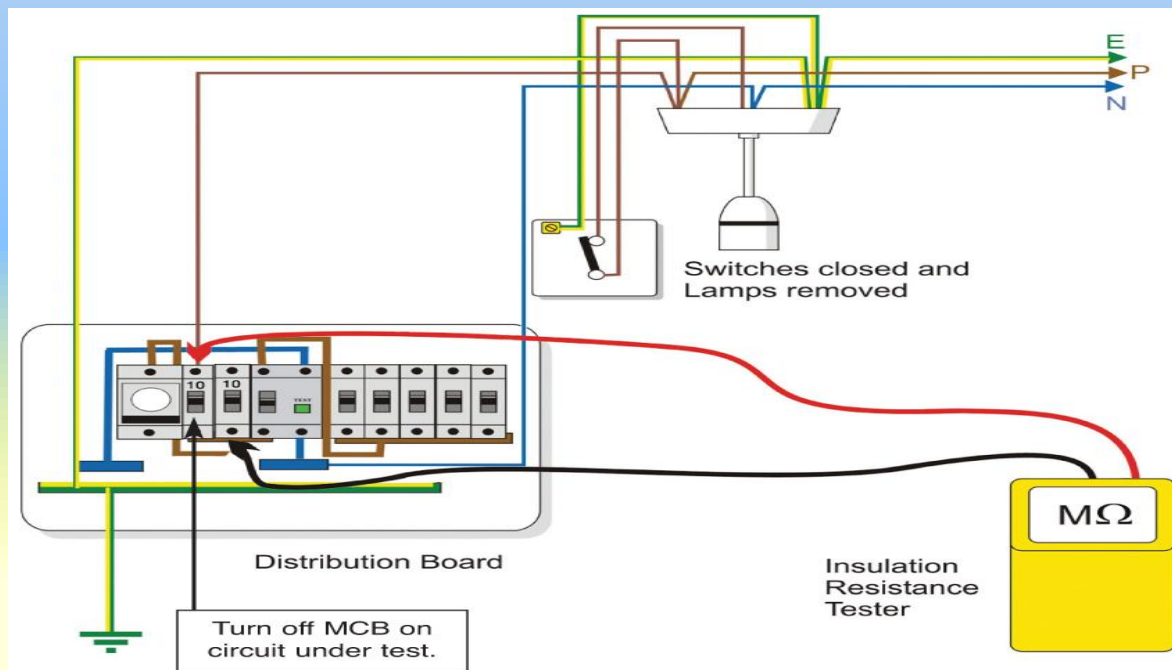
The test procedure is to measure the insulation resistance between the live conductors of each separated circuit connected together and the live and protective conductors of any other circuits connected together.

4/15 - Test 6 - Erroneous connections

The following test shall be carried out in order to detect erroneous connections between circuits: For each circuit, its protective device shall be switched off and an insulation test in accordance with Table 61A applied between phase conductors of that particular circuit and all other phase conductors.

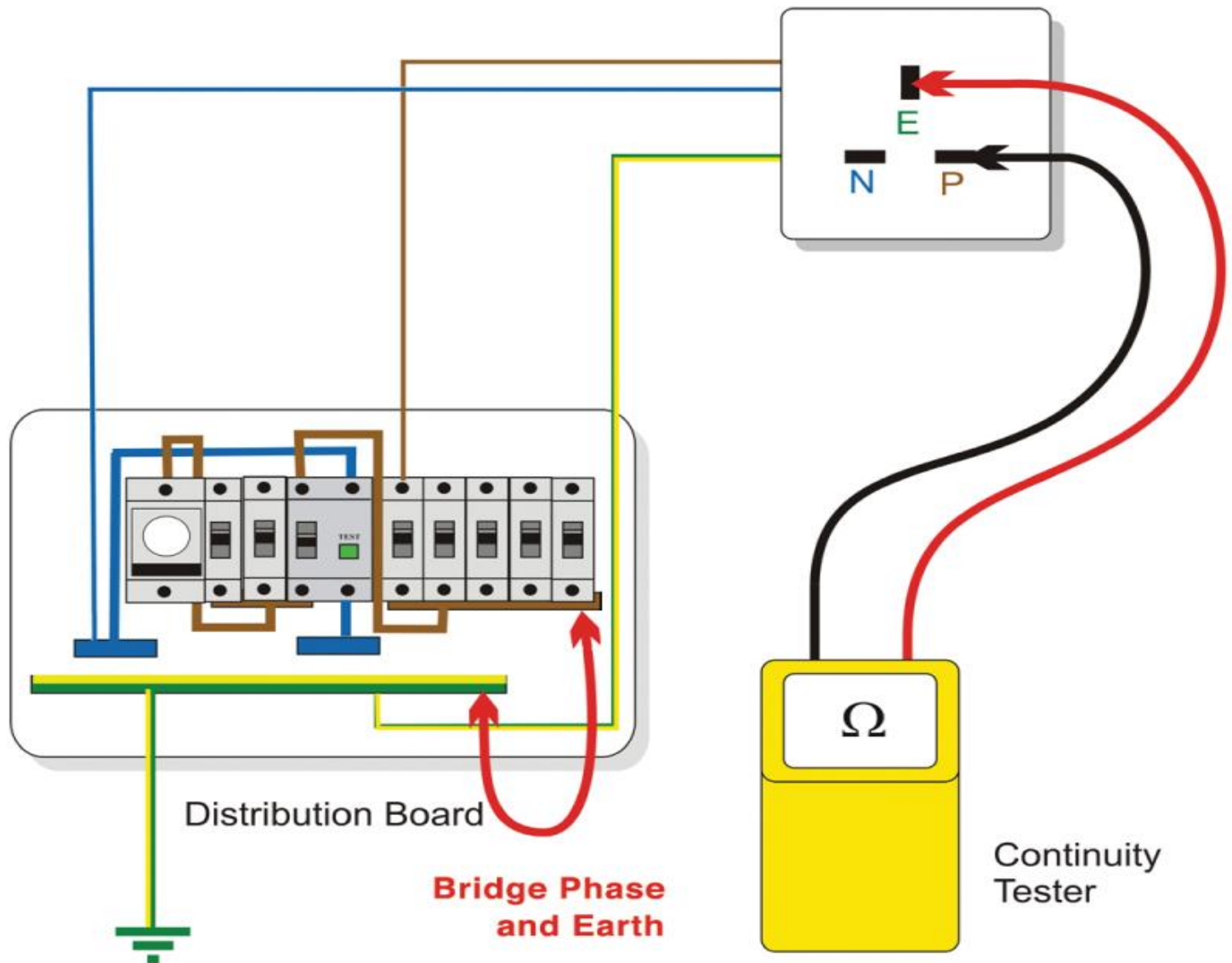
Note 1: This is an additional test to those specified in CENELEC HD 384.6.61:1992

Note 2: All loads in the circuit under test must be disconnected e.g. appliances switched off, lamps removed.

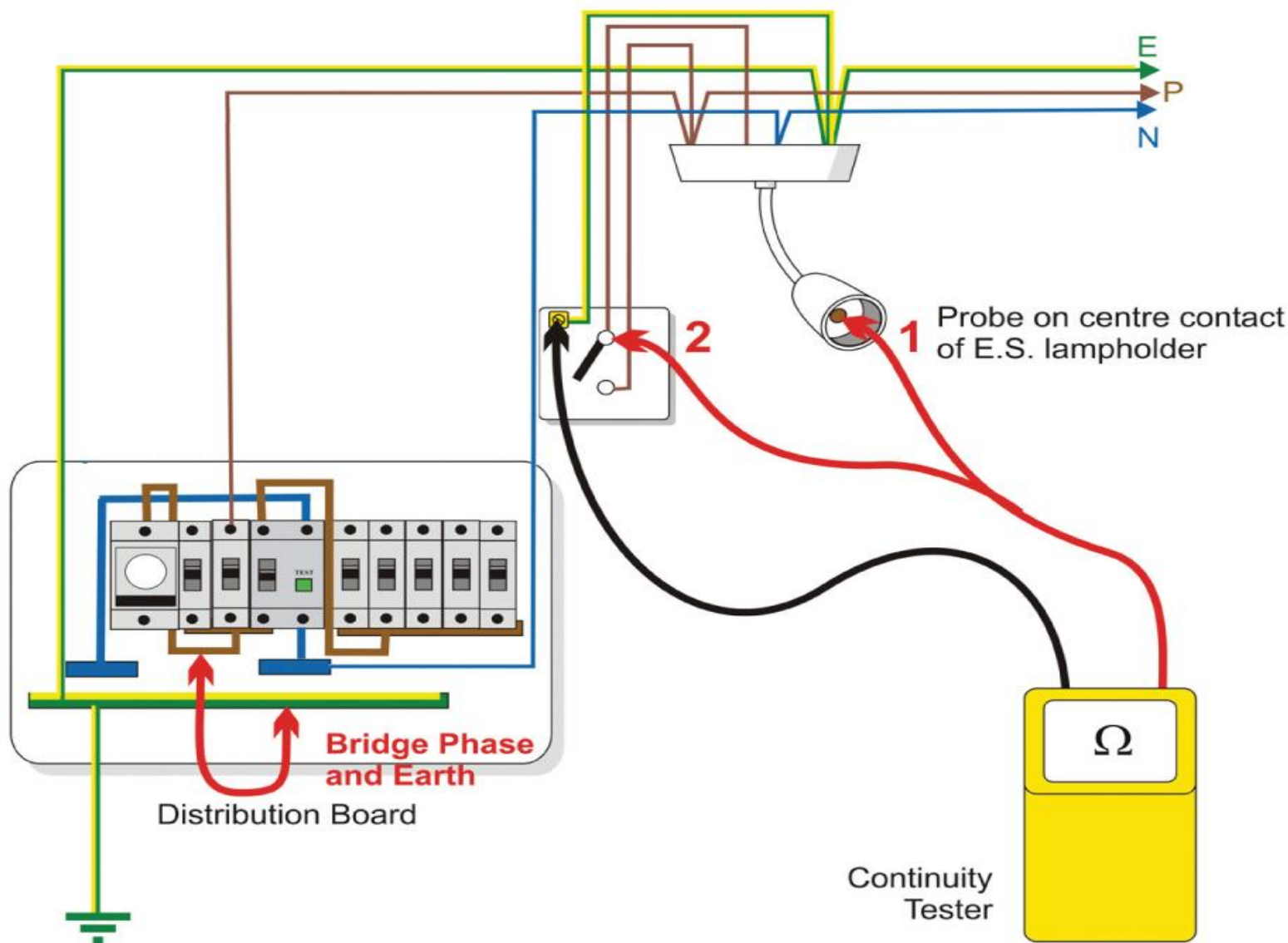


- Polarity tests are necessary to verify that:
  - Polarity at the incoming supply point is correct.
  - All fuses, protective devices and switches are connected in the phase conductors only.
  - Supply phase is connected to the centre back contact of screw type fuse bases.
  - Wiring is correctly connected at socket outlets and similar accessories.
  - Centre contacts of screw type lamp holders are connected to the switched phase conductors.
- Incorrect polarity is a serious hazard in an electrical installation ranging in degree from incorrect polarity of the entire installation to protective devices failing to clear a phase to earth fault though being connected in the neutral or individual loads or appliances remaining live when switched off through switching of neutral instead of phase. All such situations create very serious risks to life and verification of polarity in advance of connection of an installation to the supply is essential.
- No particular method for testing of polarity is specified in the National Wiring Rules and methods in common use are outlined below.

4/17 - Test 7 – Polarity test of socket outlets



4/18 - Test 7 — Polarity test of switch and E.S. Lamp-holder connections



- Measurement of L-E loop impedance at the main distribution board, sub distribution board(s), if any, and at the furthest point of each circuit is required to verify that protective devices will operate within the required disconnection time in the event of a phase to earth fault.
- Measurements are made using a fault loop impedance tester designed specifically for the purpose of these tests. If the instrument is not designed to prevent the tripping of RCDs it will be necessary to short out RCDs for the duration of the test. Ensure that the shorting out connection is removed on conclusion of the test. Remember that when an RCBO is bridged out no short circuit protection is present.

Test Procedure

- ***Fault Loop Impedance at a Distribution Board***

Using the 3 lead attachment with the fault loop impedance tester connect the L lead to the output side of the main fuse in the distribution board and the N and E leads to the N and E terminal blocks at the distribution board. Set the instrument at a low resistance range such as 20Ω , press the test button and read the L-E loop impedance.

- ***Fault Loop Impedance of each Circuit***

The fault loop impedance must be measured at the furthest point in each circuit. Since these are live tests it is important to ensure the integrity of protective conductors and connections before tests are made.

For general purpose socket circuits the 13amp plug lead is used with the loop impedance tester set at a low ohms range such as 20 ohms. The instrument is plugged into the furthest socket in the circuit, test button pressed and measurement taken.

For fixed appliances and lighting circuits the same procedure is followed using the 3 lead attachment to connect the instrument to the L, N and E at the end of the circuit under test.

- **Verification of Test Results**

The L-E loop impedance measurements taken and recorded in test records sheets need to be compared with the maximum values quoted for the associated protective device in Table A61C-1 (0.4 second trip time) or Table A61C-2 (5 second trip time).

4/22 - Test 8 – Line to earth fault loop impedance (613.3)

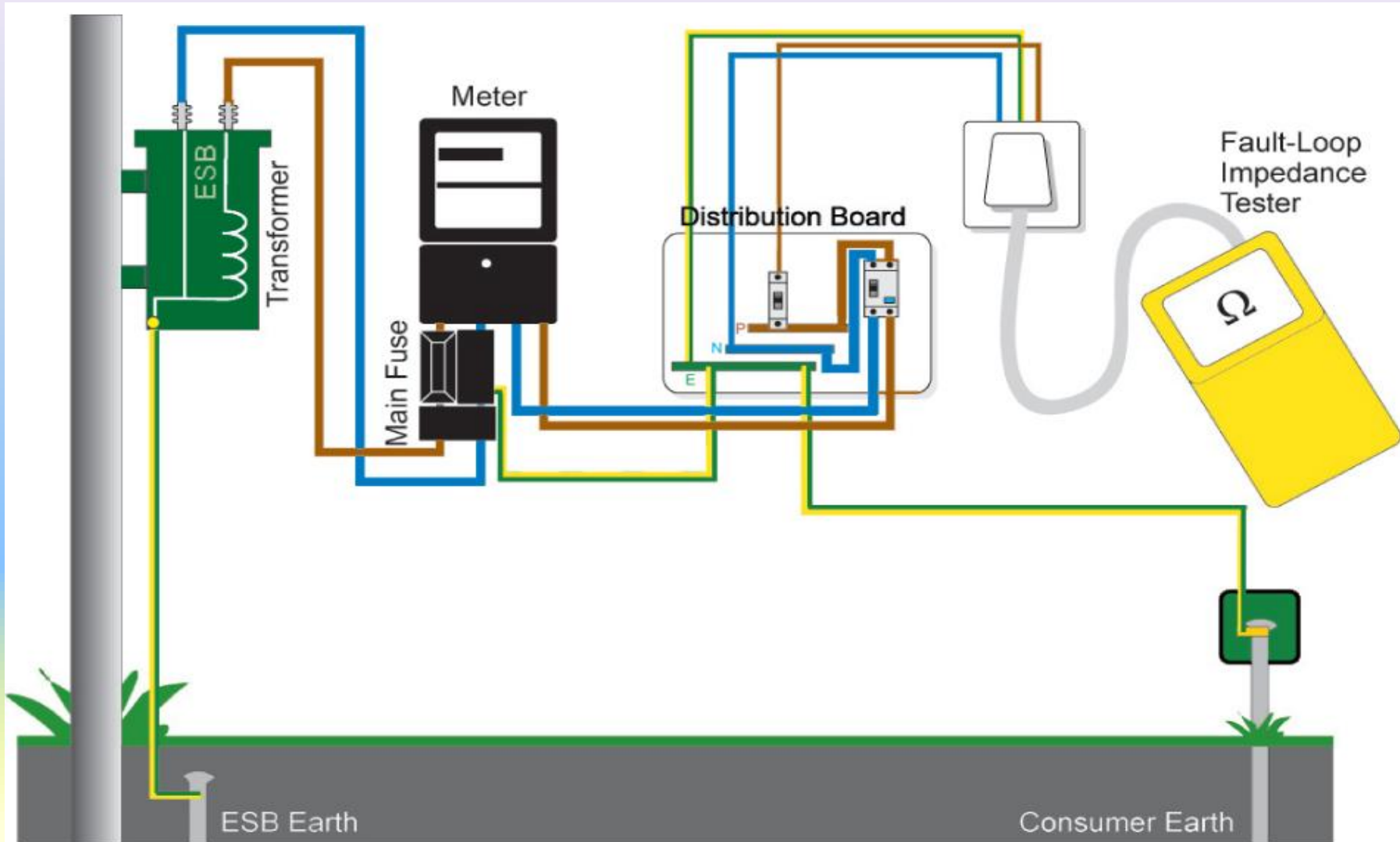


Fig. 12 Fault Loop Impedance Test

- This important post-connection test is required to verify that RCDs will operate within the specified time when the appropriate fault condition is simulated.
- The primary function of an RCD is to provide protection against electric shock in case of a fault (indirect contact) in cases where this is specified in the national wiring rules such as circuits supplying socket, immersions heaters, water heating appliances and all 230V supplies in zones 1, 2 and 3 of bathroom.
- RCDs also provide valuable additional protection against electric shock in normal service (direct contact) by sensing a shock current through a person in contact with a live part and disconnecting supply within 0.3 second.
- The test instrument used is an RCD tester designed specifically for the purpose of these tests.

- Test procedure:
  - The test instrument is connected to the phase and earth at any convenient point on the load side of the RCD under test with the load disconnected. A 3 pin plug is used for making connection at a socket or a 3 lead attachment can be used for making connection at a fixed appliance.
  - The instrument is set to 50% of the rated trip current and the test button operated. In these circumstances the RCD should not trip.
  - The instrument is then set to the rated trip current (typically 30ma), the test button operated and the trip time noted.
- Most RCD testers incorporate a facility for testing during the positive or negative half cycle of the supply waveform. Where this facility is available the test should be repeated for the alternative half cycle and the longer of the two trip times noted.

4/25- Test 9 – Verification of operation of RCDs (613.14)

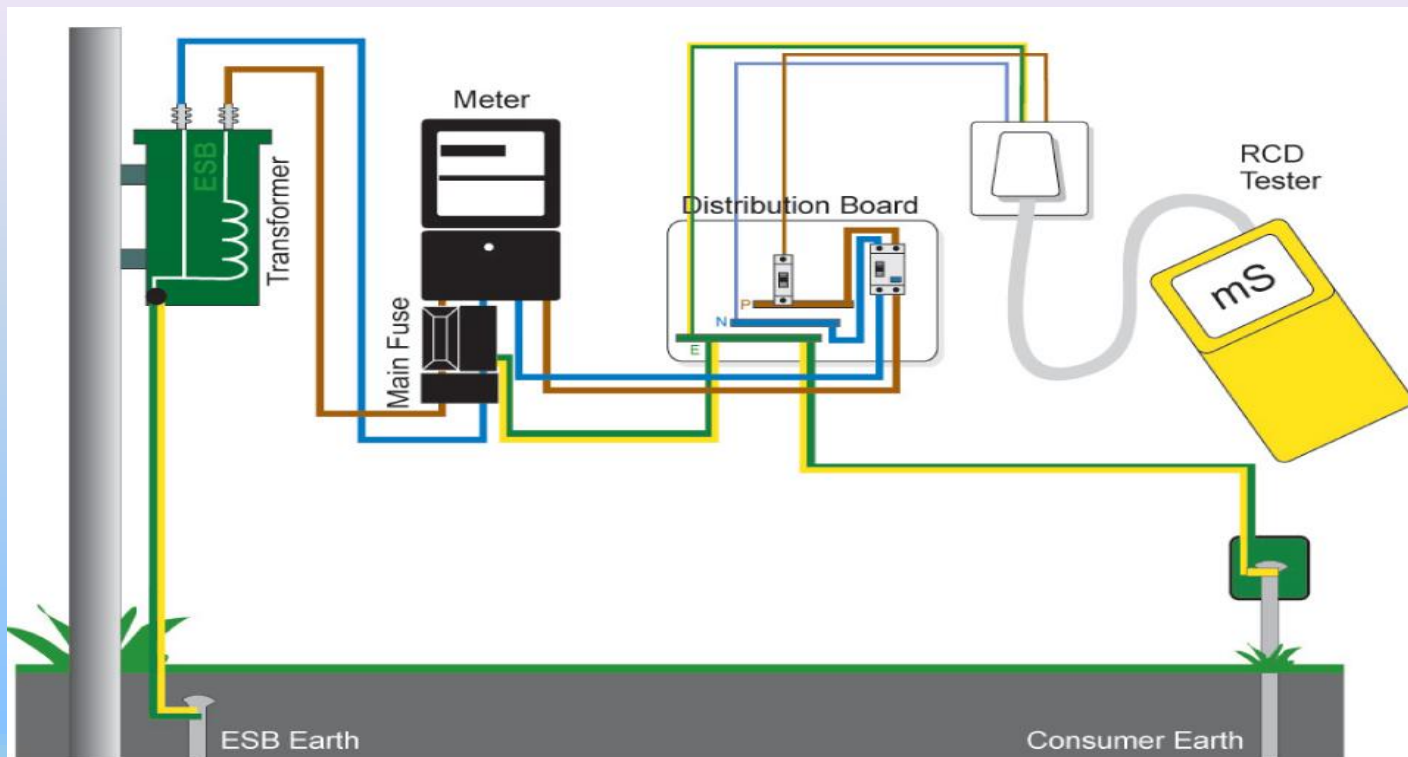


Fig. 13 Verification of RCD Operation

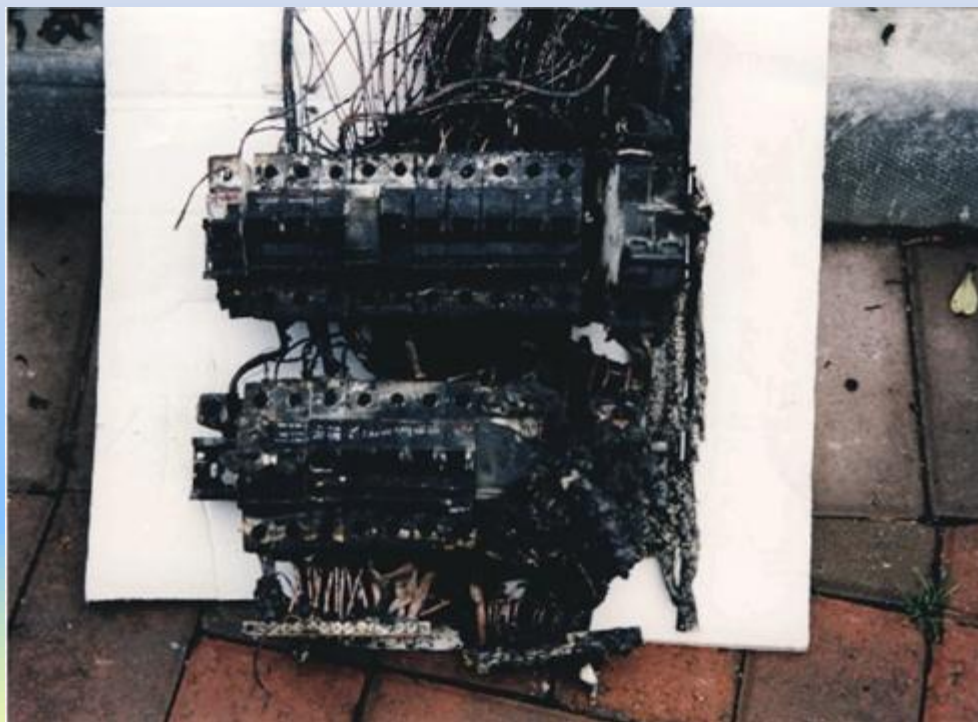
531.2.1.3

Account shall be taken of the possible presence of d.c. components in a circuit protected by an RCD that could affect the operation of the RCD and a suitable type shall be chosen as follows:

- i) where no significant d.c. component is present: Type AC;
- ii) where equipment produces pulsating direct currents: Type A;
- iii) where equipment produces smooth direct currents: Type B.

55

6/1 – Example of fire damages



6/2 – Example of fire damages



6/4 – Example of fire damages



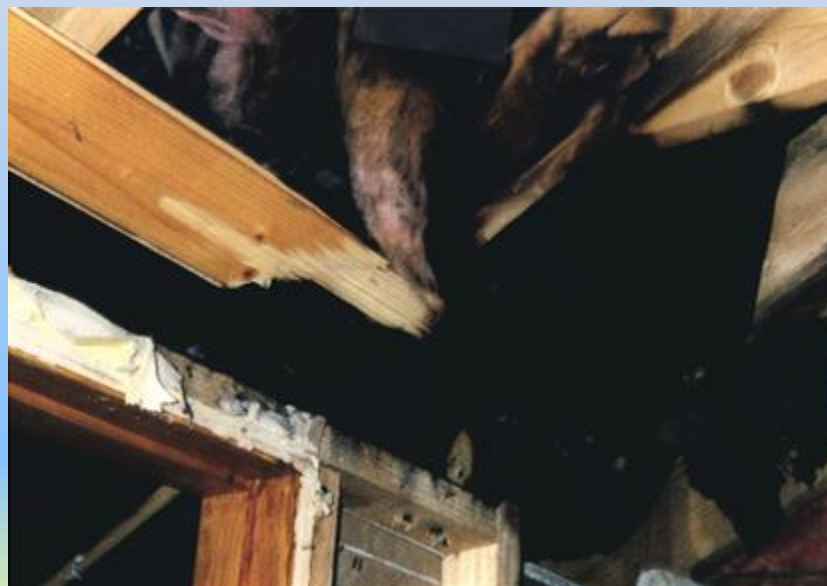
6/3 – Example of fire damages



6/5 – Example of fire damages



6/6 – Example of fire damages

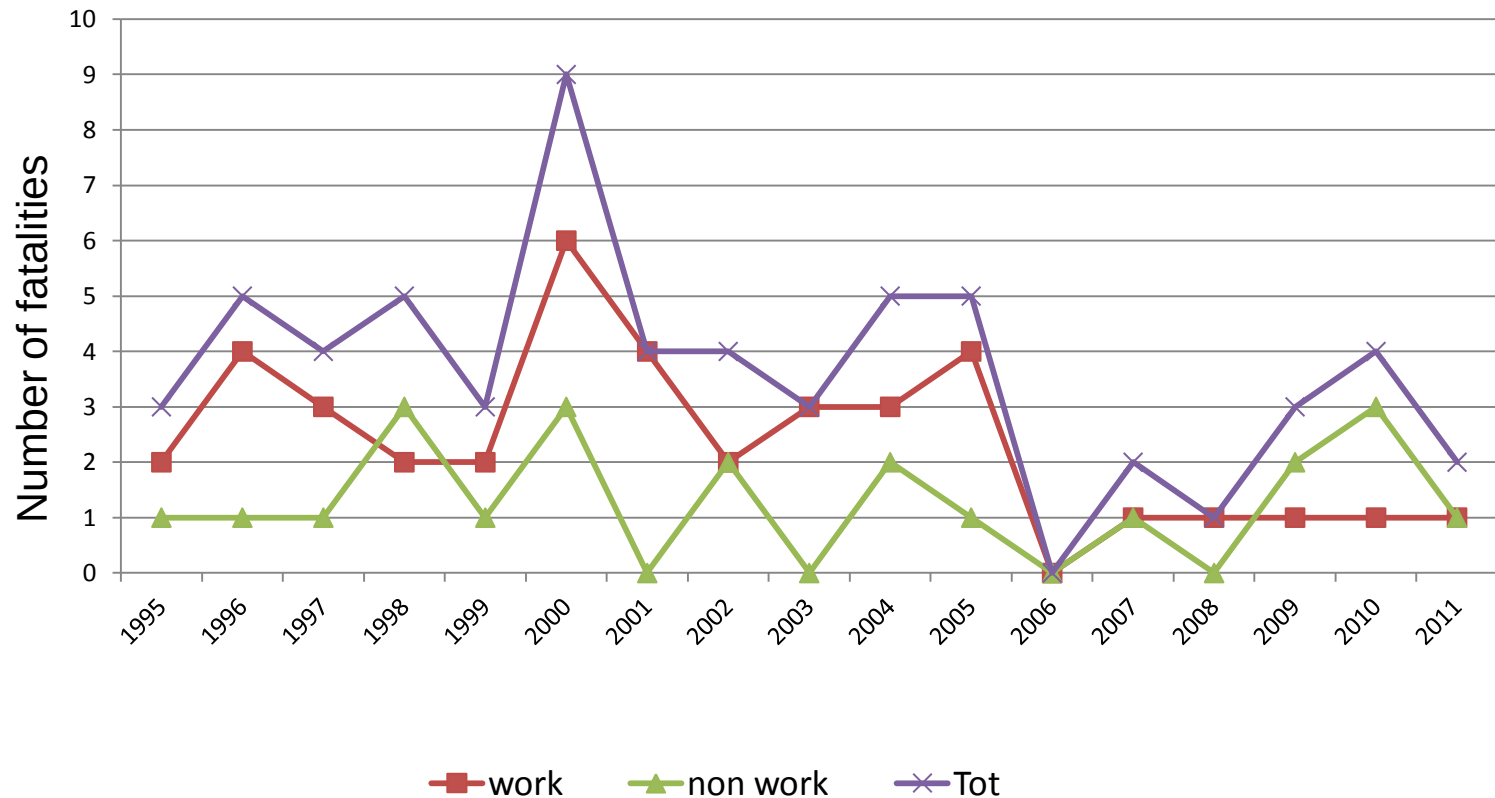


6/7 – Example of fire damages



- In Ireland, there have been 62 electrocutions or deaths from the explosive/burning effects of electricity since 1995.
- Of those, 40 deaths have been associated with a work activity.
- The remaining 22 have occurred in domestic situations or as a result of trespass, vandalism or in one case a fallen overhead power line.
- The [Electro Technical Council of Ireland \(ETCI\)](#), and in particular, their Technical Committee dealing with Safety (TC5), monitors all aspects of electrical safety in the country and also issue several publications on the entire area of electrical safety

Electrical Fatalities 1995-2011 (Source: HSA)



Each number shown above represents a person killed due to electricity.

8/1 – Completion Cert No 1

Appendix E Completion Cert No. 1



National Rules for Electrical Installations

Completion Certificate for an Installation

with a Maximum Import Capacity < 50kVA



RECI
REGISTERED

† MPRN No.

AR 1141176

CUSTOMER NAME (Block Capitals): .....

ADDRESS OF INSTALLATION (Block Capitals): .....

PREMISES DESCRIPTION (e.g. Shop, Domestic, Agricultural, etc.): .....

Date of Installation .....

✓ Tick boxes as appropriate:

THIS CERTIFICATE IS IN RESPECT OF: CONSTRUCTION & TEST OF INSTALLATION ☐ OR TEST ONLY OF THE EXISTING INSTALLATION ☐

TYPE OF INSTALLATION: New ☐ Reconnection ☐ Alteration ☐ † Temporary supply ☐ Other ☐ †

NUMBER OF: Lighting Points Socket Outlets Fixed Appliance Outlets

TEST RESULTS

POLARITY AND EARTHING OF ALL OUTLETS VERIFIED (a tick indicates yes) ☐

MAIN EQUIPOTENTIAL BONDING VERIFIED FOR:

GAS	YES	NA
WATER		
OTHER (specify see details)		

TESTS (please insert values)

RESISTANCE OF PROTECTIVE CONDUCTOR Ω (max)

INSULATION RESISTANCE MΩ (min)

DETAILS OF TESTS ETC. ARE GIVEN IN TEST RECORD SHEET NO. ....

† See Chapter 63 "National Rules (ET101)"

* NA means Not Applicable

Associate Sub System Certificate Numbers Yes* ☐ No ☐

*See comment box for details

ALL NEW WORK MUST BE CERTIFIED IN RESPECT OF CONSTRUCTION & TESTING

COMMENT OR DETAILS:

REGISTERED CONTRACTOR (Block Capitals)

Name: .....

Address: .....

Tel: ..... RECI Reg No.

CERTIFICATION

I certify that the electrical installation at the above address has been constructed, and/or pre-connection tests have been carried out, in accordance with the National Rules for Electrical Installations (current issue at date of contract) published by the Electro-Technical Council of Ireland, and has been found to be satisfactory. Test Record Sheets are held by me.

PRE-CONNECTION Pre-connection tests completed and found to be satisfactory

Signed: ..... For Electrical Installation: Constructor ☐ Tester ☐

Qualification: ..... Certifier's No. .... Date: .....

MAX FAULT LOOP IMPEDANCE Ω

RATING & TYPE OF THE ASSOCIATED PROTECTIVE DEVICE

RCD CIRCUIT DESCRIPTION

OPERATION OF ALL RCDS VERIFIED ☐ RCD TRIPPING TIME TESTS

30 mA RCD Max Trip Time @ 30mA	_____ ms
100 mA RCD Max Trip Time @ 100mA	_____ ms
300 mA RCD Max Trip Time @ 300mA	_____ ms
500 mA RCD Max Trip Time @ 500mA	_____ ms

N.B. THESE TESTS MUST BE COMPLETED IMMEDIATELY AFTER SUPPLY IS MADE AVAILABLE

POST-CONNECTION Post-connection tests completed and found to be satisfactory

Signed: ..... For Electrical Installation: Constructor ☐ Tester ☐

Qualification: ..... Certifier's No. .... Date: .....

NOTE: This certificate is issued and signed by the person responsible for the constructing and testing, or testing only of the installation or a person duly authorised. This certificate should be used only for installations with a maximum import capacity < 50kVA. A different certificate is required for other installations.

This Document is a certificate for the purpose of the Energy (Miscellaneous Provision) Act 2006.

The Electro-Technical Council of Ireland or the Register of Electrical Contractors of Ireland are not responsible for the electrical installation or for the accuracy of the information given on this certificate. Electrical installations should be inspected periodically.

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8/2 – Completion Cert No 1 (Electronic)

Appendix F Completion Cert No. 1 (Electronic)

Completion Certificate for Electrical Installations < 50kVA			
Certificate No: ARE0004719			
Customer Name:	00000 00000000	MPRN: 10 311 311 311	
Address of Installation:	00000, 000000		
Premises Description:	Dublin Domestic	Date of Installation: 18/05/2006	
This Certificate is in respect of:	Construction & Test of the Installation ☒		
	Test only of the Installation ☐		
Type of Installation:	New ☒ Alteration ☐ Temporary Supply ☐ Other ☐		
Number of:	Lighting Points ☐ Socket Outlets ☐ Fixed Appliance Outlets ☐		
Polarity and Earthing of all Outlets verified.	☒ YES ☐ NO	Verification of RCDs Operation	☒ YES ☐ NO
		Main Equipotential Bonding Verified for:	
		Gas	☒ YES ☐ NA
		Water	☒ YES ☐ NA
		Other	☐ YES ☒ NA
Test Record Sheet Nos 111			
Insert Test Values			
Min Insulation Resistance	____	Max Resistance of Protective Conductor	____
Max Fault Loop Impedance	____	Rating & type of Associated Protective Device	MCB Type B (IS/EN 60898) 20 A
Trip Time 30mA RCDs at 30mA	____	ms	ms
		ms	
Comment or details:	All new work must be certified in respect of Construction & Testing		
	RECI Registered Contractor:	A0000	
	Name:	ELECTRICAL CONTRACTOR	
	Address:	000000000, 000000000 000000000	
	Contact Details:	Phone: n/a	
Pre-Connection (Pre-Connection tests completed and found to be satisfactory)			
For Electrical Installation:	Constructor ☒	Tester ☐	Date: 18/05/2006
Post-Connection (Post-Connection tests completed and found to be satisfactory)			
For Electrical Installation:	Constructor ☒	Tester ☐	Date: 01/08/2007
Post-Connection Certification:			
'I, ELECTRICAL CONTRACTOR certify that the electrical installation at the above address has been constructed and pre and post- connection tests have been carried out in accordance with the National Rules for electrical Installations (current issue at date of contract) published by the Electro-Technical Council of Ireland, and has been found to be satisfactory. Test records are held by me.'			
Signed w.....	Signature Date.....		
Note:			
This certificate is issued and signed by the person responsible for the construction and testing, or testing only of the installation or a person duly authorised. This certificate should be used only for Electrical Installations < 50kVA . A different certificate is required for other installations. Installations in Agricultural premises require a Supplementary Agricultural Certification form.			
The Register of Electrical Contractors of Ireland or Electro-Technical Council of Ireland are not responsible for the installation or for the accuracy of the information given on this certificate. Electrical installations should be checked periodically.			

8/3 – Completion Cert No. 2

Appendix G Completion Cert No. 2



National Rules for Electrical Installations
Completion Certificate for Installations ≥ 50kVA



RECI REGISTERED

† MPRN No. BR **20908**

CUSTOMER NAME (Block Capitals): .....

ADDRESS OF INSTALLATION (Block Capitals): .....

PREMISES DESCRIPTION ..... Date of Installation: .....

✓ Tick boxes as appropriate:

THIS CERTIFICATE IS IN RESPECT OF: CONSTRUCTION & TEST OF INSTALLATION ☐ OR TEST ONLY OF THE EXISTING INSTALLATION ☐

TYPE OF INSTALLATION: New ☐ Reconnection ☐ Alteration ☐ † Temporary supply ☐ Other ☐ †

Insert Figures as appropriate: MAXIMUM IMPORT CAPACITY: ..... kVA

TYPE	kW	TYPE	kW	OTHER EQUIPMENT	kW
LIGHTING POINTS		TRANSFORMERS			
SOCKET OUTLETS		GENERATORS			
HEATING EQUIPMENT		LIFTS			
MOTORS					

TEST RESULTS POLARITY AND EARTHING OF ALL OUTLETS VERIFIED (a tick indicates yes) ☐ MAIN EQUIPOTENTIAL BONDING VERIFIED FOR: ☐

TESTS (please insert values): RESISTANCE OF PROTECTIVE CONDUCTOR (max) Ω INSULATION RESISTANCE (min) MΩ

	YES	NA [‡]
GAS		
WATER		
OTHER (specify see details)		

DETAILS OF TESTS ETC., ARE GIVEN IN TEST RECORD SHEET NO. ....

Associate Sub-System Certificate Numbers Yes ☐ No ☐ *See comment box for details

† See Ch 63 "National Rules (ET101)" ‡ NA means Not Applicable

ALL NEW WORK MUST BE CERTIFIED IN RESPECT OF CONSTRUCTION & TESTING

COMMENT OR DETAILS:

.....

.....

.....

REGISTERED CONTRACTOR (Block Capitals)

Name: .....

Address: .....

Tel: ..... RECI Reg No.

CERTIFICATION

I certify that the electrical installation at the above address has been constructed, and/or pre-connection tests have been carried out, in accordance with the National Rules for Electrical Installations (current issue at date of contract) published by the Electro-Technical Council of Ireland, and has been found to be satisfactory. Test Record Sheets are held by me.

PRE-CONNECTION Pre-connection tests completed and found to be satisfactory

Signed: ..... For Electrical Installation: Constructor ☐ Tester ☐

Qualification: ..... Certifier's No. .... Date: .....

MAX FAULT LOOP IMPEDANCE Ω

OPERATION OF ALL RCDS VERIFIED ☐

N.B. THESE TESTS MUST BE COMPLETED IMMEDIATELY AFTER SUPPLY IS MADE AVAILABLE

RATING & TYPE OF THE ASSOCIATED PROTECTIVE DEVICE

30 mA RCD Max Trip Time @ 30mA	100 mA RCD Max Trip Time @ 100mA	300 mA RCD Max Trip Time @ 300mA	500 mA RCD Max Trip Time @ 500mA
____ ms	____ ms	____ ms	____ ms

RCD CIRCUIT DESCRIPTION

↓

.....

POST-CONNECTION Post-connection tests completed and found to be satisfactory

Signed: ..... For Electrical Installation: Constructor ☐ Tester ☐

Qualification: ..... Certifier's No. .... Date: .....

NOTE: This certificate is issued and signed by the person responsible for the constructing and/or testing of the installation or a person duly authorised. This certificate should be used only for installations ≥ 50kVA. A different certificate is required for other installations. This document is a Certificate for the purpose of the Energy (Miscellaneous Provisions) Act 2006. The Electro-Technical Council of Ireland or the Register of Electrical Contractors of Ireland are not responsible for the electrical installation or for the accuracy of the information given on this certificate. Electrical installations should be inspected periodically. © ETIC 2010 This document must not be re-produced in any form or manner without the express permission of the Electro-Technical Council of Ireland.

8/4 – Completion Cert No 2 (Electronic)

Appendix H Completion Cert No.2 (Electronic)

Completion Certificate for Electrical Installations $\geq 50\text{kVA}$					
Certificate No: BRE0001075					
Customer Name:	mm mm		MPRN : 10 304 148 199		
Address of Installation:	GALWAY WEST BUSINESS PARK BOTHAR STIOPHAN, GALWAY Galway				
Premises Description:	Commercial		Date of Installation: 04/04/2008		
This Certificate is in respect of:	Construction & Test of the Installation		☐		
	Test only of the Installation		☐		
Type of Installation:	New ☐	Alteration ☐	Temporary Supply ☐	Other ☐	
Maximum Import Capacity	300 kVA				
	kW.	TYPE	kW	TYPE	kW
Polarity and Earthing of all Outlets verified.	☒ YES	Verification of RCDs Operation	☒ YES	Main Equipotential Bonding Verified for:	
				Gas	☐ YES ☐ NA
				Water	☐ YES ☐ NA
				Other	☐ YES ☐ NA
Test Record Sheet Nos 1					
Insert Test Values					
Min Insulation Resistance	MΩ <	Max Resistance of Protective Conductor		Ω	
Max Fault Loop Impedance	Ω	Rating & type of Associated Protective Device		A	
Trip Time 30mA RCDs at 30mA	Sockets ms	ms	ms	ms	
Associate Sub System Certificate Numbers	Yes* ☐	No ☐	*See Comment box for details		
All new work must be certified in respect of Construction & Testing					
Comment or details:	RECI Registered Contractor: A0000 Name: ELECTRICAL CONTRACTOR Address: 000000000, 000000000 000000000 Contact Details: Phone: n/a				
Pre-Connection (Pre-Connection tests completed and found to be satisfactory)					
For Electrical Installation:	Constructor ☐	Tester ☐	Date: 11/04/2008		
Pre-Connection Certification:					
'I, ELECTRICAL CONTRACTOR certify that the electrical installation at the above address has been constructed and pre-connection tests have been carried out in accordance with the National Rules for electrical Installations (current issue at date of contract) published by the Electro-Technical Council of Ireland, and has been found to be satisfactory. Test records are held by me.'					
Signed			Signature Date.....		
Note: This certificate is issued and signed by the person responsible for the construction and testing, or testing only of the installation or a person duly authorised. This certificate should be used only for Electrical Installations $\geq 50\text{kVA}$. A different certificate is required for other installations. Installations in Agricultural premises require a Supplementary Agricultural Certification form.					
The Register of Electrical Contractors of Ireland or Electro-Technical Council of Ireland are not responsible for the installation or for the accuracy of the information given on this certificate. Electrical installations should be checked periodically.					



**National Rules for Electrical
Installations Sub-System
Completion Certificate**
 SR 26041



RECI
REGISTERED

Associated ETCI Completion Certificate No (if applicable): .....

CUSTOMER NAME (Block Capitals): .....

ADDRESS OF INSTALLATION (Block Capitals): .....

Concise Installation Description (e.g. Lift, Air Conditioning, etc)†: .....

Date of Installation: .....

✓ Tick boxes as appropriate:
 THIS SUB-SYSTEM CERTIFICATE IS IN RESPECT OF: CONSTRUCTION & TEST OF INSTALLATION ☐
 OR TEST ONLY OF THE EXISTING INSTALLATION ☐

TEST RESULTS

POLARITY AND EARTHING OF ALL OUTLETS VERIFIED (a tick indicates yes) ☐	MAIN EQUIPOTENTIAL BONDING VERIFIED FOR:	<table border="1" style="margin: auto;"> <tr> <td style="padding: 2px;">GAS</td> <td style="padding: 2px;">YES</td> <td style="padding: 2px;">NA†</td> </tr> <tr> <td style="padding: 2px;">WATER</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">OTHER (see details)</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> </table>	GAS	YES	NA†	WATER			OTHER (see details)		
GAS	YES	NA†									
WATER											
OTHER (see details)											

TESTS (please insert values)

RESISTANCE OF PROTECTIVE CONDUCTOR (max) ____ Ω	INSULATION RESISTANCE (min) ____ MΩ	

† See Chapter 63 "National Rules (ET101)"
 ‡ NA means Not Applicable

DETAILS OF TESTS ETC., ARE GIVEN IN TEST RECORD SHEET TYPE/NO. ....

ALL NEW WORK MUST BE CERTIFIED IN RESPECT OF CONSTRUCTION & TESTING

COMMENT OR DETAILS:	REGISTERED CONTRACTOR (Block Capitals) Name: ..... Address: ..... Tel: ..... RECI Reg No. ____ ____ ____ ____ ____

CERTIFICATION

I certify that the electrical-sub system installation at the above address has been constructed, and/or pre-connection tests have been carried out, in accordance with the National Rules for Electrical Installations (current issue at date of contract) published by the Electro-Technical Council of Ireland, and has been found to be satisfactory. This Certificate and Test Record Sheets associated with it shall be submitted to the Project Supervisor Construction and included in the Project Safety File.

PRE-CONNECTION Pre-connection tests completed and found to be satisfactory

Signed : ..... For Sub-System Electrical Installation: Constructor ☐ Tester ☐

Qualification: ..... Certifier's No. .... Date: .....

MAX FAULT LOOP IMPEDANCE ____ Ω	RATING & TYPE OF THE ASSOCIATED PROTECTIVE DEVICE ____	RCD CIRCUIT DESCRIPTION ↓								
OPERATION OF ALL RCDS VERIFIED ☐ N.B. THESE TESTS MUST BE COMPLETED IMMEDIATELY AFTER SUPPLY IS MADE AVAILABLE	<table border="0"> <tr> <td style="font-size: 0.8em;">30 mA RCD Max Trip Time @ 30mA</td> <td style="text-align: right;">ms</td> </tr> <tr> <td style="font-size: 0.8em;">100 mA RCD Max Trip Time @ 100mA</td> <td style="text-align: right;">ms</td> </tr> <tr> <td style="font-size: 0.8em;">300 mA RCD Max Trip Time @ 300mA</td> <td style="text-align: right;">ms</td> </tr> <tr> <td style="font-size: 0.8em;">500 mA RCD Max Trip Time @ 500mA</td> <td style="text-align: right;">ms</td> </tr> </table>	30 mA RCD Max Trip Time @ 30mA	ms	100 mA RCD Max Trip Time @ 100mA	ms	300 mA RCD Max Trip Time @ 300mA	ms	500 mA RCD Max Trip Time @ 500mA	ms	↓
30 mA RCD Max Trip Time @ 30mA	ms									
100 mA RCD Max Trip Time @ 100mA	ms									
300 mA RCD Max Trip Time @ 300mA	ms									
500 mA RCD Max Trip Time @ 500mA	ms									

POST-CONNECTION Post-connection tests completed and found to be satisfactory

Signed : ..... For Sub-System Electrical Installation: Constructor ☐ Tester ☐

Qualification: ..... Certifier's No. .... Date: .....

NOTE: This certificate is issued and signed by the person responsible for the constructing and testing, or testing only of the sub-system installation or a person duly authorised.

This Document is a certificate for the purpose of the Energy (Miscellaneous Provision) Act 2006.

The Electro-Technical Council of Ireland or the Register of Electrical Contractors of Ireland are not responsible for the electrical installation or for the accuracy of the information given on this certificate. Electrical installations should be inspected periodically.

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Re

8/7 – Minor Works Declaration

Appendix K Minor Works Declaration

RECI REGISTERED

Declaration of Compliance with ET101 for Minor Electrical Installation Works

THIS CANNOT BE USED TO OBTAIN ELECTRICITY SUPPLY FROM THE DSO
To be used only for minor alterations to existing electrical installations. (See ET101 Annex 63B for details).

MPRN No: RD **10841**

CUSTOMER NAME (Block Capitals): ..... **DATE:** .....

ADDRESS OF INSTALLATION (Block Capitals): .....

DESCRIPTION OF MINOR ELECTRICAL WORK CARRIED OUT: .....

NUMBER OF: LIGHTING POINTS SOCKET OUTLETS FIXED APPLIANCES

OTHER WORKS .....

COMMENTS: .....

TESTS (for Minor Work Completed) Insert Test Values or tick as appropriate

MIN. INSULATION RESISTANCE ____ MΩ	POLARITY AND EARTHING VERIFIED ____ Yes	RESISTANCE OF PROTECTIVE CONDUCTOR ____ Ω
FAULT LOOP IMPEDANCE ____ Ω	AND RATING & TYPE OF ASSOCIATED PROTECTIVE DEVICE ____ A	
TRIP TIME 30mA RCD AT 30mA ____ ms	EQUIPOTENTIAL BONDING VERIFIED ____ Yes ____ N/A	

DECLARATION

I declare that the minor electrical installation work at the above address has been constructed and tested in accordance with the National Rules for Electrical Installations (current issue at date of contract) published by the Electro-Technical Council of Ireland and has been found to be satisfactory and that the said works do not impair the safety of the existing installation.

REGISTERED CONTRACTOR (Block Capitals) NAME: ..... ADDRESS:	SIGNED: ..... QUALIFICATION: ..... DATE: ..... PHONE: ..... Reg. No. ____ ____ ____ ____ ____

EXISTING INSTALLATION

General comments on existing installation, including adequacy of existing protective devices, earthing and bonding arrangements.
WARNING: The upstream part of the existing installation to which the new minor works is connected must comply with ET101 (Current Edition).

COMMENTS

.....
.....
.....

NOTE:
This document is issued and ..... by the person responsible for constructing and testing the installation or a person duly authorised to act on his/her behalf.
Electrical installations should be inspected periodically.
The Electro-Technical Council of Ireland or Register of Electrical Contractors of Ireland are not responsible for the electrical installation or for the accuracy of information given on this document.
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- No electrical installation, no matter how carefully designed and erected can be expected to last forever.
- Deterioration will take place due to age as well as due to normal wear and tear.
- The Wiring Rules recommend that every installation should be inspected and tested periodically as appropriate to use and the environment to ensure that it still complies with the Rules.
- The time interval between inspections will depend on the type of installation and the way in which it is used.
- An overall visual appraisal of the installation should be conducted at the outset. This is required to assess the nature and scope of the installation, whether any hazards could arise in the testing process and the degree of any limitations that may need to be agreed with the client.

9/2 – Periodic inspection and testing

- The Periodic Inspections Report form consists of four A4 pages in “fold-over” form and includes a section for observations and recommendations. This allows the contractor to list any defect, omission and non compliance with standards revealed by the inspection and testing.
- The list of items are coded under the following headings:
  1. Requires urgent attention.
  2. Requires improvement.
  3. Requires further investigation.
  4. Does not comply with current national standards.

9/3 – Periodic inspection and testing

Appendix L Periodic Inspection Form (Page 1)

Date _____		Periodic Inspection Report for an Electrical Installation		N000000000000	
Registered Contractor Details :				Installation Details:	
Name _____				Occupant Name/Trading as _____	
Address _____				Address _____	
Reg No. _____		Installation Approx Age.....		Occupant In Attendance ? Yes/No	
<u>Please circle answers or tick boxes as appropriate</u>					
Installation Category ? Domestic ☐		Commercial ☐	Industrial ☐	Other (specify) _____	
Reason for Inspection?		Insurance Inspection ☐	Safety Audit ☐	If Other (specify) _____	
Extent of Installation covered by this report ? Entire Installation*		☐ YES	☐ NO (see partial inspection details below)		
* N.B. Cables concealed within trunking and conduits within the fabric of the building or underground <u>have not</u> been inspected unless stated otherwise.					
If Partial Inspection Specify what part the report refers to _____					
TYPE OF SYSTEM EARTHING : TNCS, TT, TNS, IT					
Installation Voltage Single Phase ☐ Three Phase ☐ L 1. ☐ L 2. ☐ L 3. ☐ L 1-L2 ☐ L2-L3 ☐ L 3-L1 ☐					
Max prospective S/C current _____ A Main isolation** and overcurrent device type ? SWITCH FUSE ☐ MCB ☐ MCCB ☐					
Nominal rating _____ A ** If a main RCD is used as a main isolating device the following details are required Rated current In _____ A					
Tripping current I Δn _____ mA					
					PAGE 1 of

Appendix L Periodic Inspection Form (Page 2)



Periodic Inspection Report for an Electrical Installation

N00000000000

N.B. Any Questions answered “**No**” must be referred to in the comment section of this report.
ALL QUESTIONS MUST BE ANSWERED

Please circle answer

1. Have all electrical outlets / accessories been inspected ? Yes No

2. Are all outlets / accessories undamaged ? Yes No

3. Are all live parts covered ? Yes No

Earthing/Bonding Details

4. If TNCS Is main protective conductor connected ? Yes No Not applicable

5. If present is it the correct size? Yes No

6. Earth Electrode Inspection Chamber ? Yes No

7. If yes... Is earth electrode visible ? Yes No

8. If yes...Is protective tape used ? Yes No

9. If visible is the earthing conductor the correct size ? Yes No

10. Is all main equipotential bonding correct ? Yes No N/A

11. All supplementary bonding correct & connections verified ? Yes No N/A

12. Protective Earthing sleeved where appropriate ? Yes No N/A

13. Polarity+earthing of all switches/outlets correct ? Yes No

14. All metallic /outlets correctly earthed ? Yes No

Distribution Board/s

15. Labelled correctly? Yes No

16. Located correctly ? Yes No

17. Sub circuit isolation & overcurrent device type ?

18. Are all devices correctly rated for S/C & O/C ? Yes No

Fuse ☐

Mcb ☐

19. Circuit sequence correct for P, N, + E ? Yes No

20. RCD's

Circuit description	Tripping Current	Longest tripping time
Sockets	30 mA	ms
Electric Shower	30 mA	ms

PAGE 2 of

9/5 – Periodic inspection and testing

Appendix L Periodic Inspection Form (Page 3)



Periodic Inspection Report for an Electrical Installation

N00000000000

General

21. Correct cable colours used at the time of installation ? Yes No
22. Are cables in good condition ? Yes No
23. Cables correctly selected ? Yes No
24. Correct routing of cables in attic area ? Yes No N/A
25. Cables correctly installed where visible ? Yes No
26. All excessive heating effects from luminaires avoided ? Yes No
27. Correctly selected accessories & switches ? Yes No
28. Are they in a good condition ? Yes No
29. Are they correctly located ? Yes No
30. Are they suitable for their environment ? Yes/No

Quality of workmanship:

Very Good

Satisfactory

Poor

Summary Test Data

Min Insulation Resistance _____ MΩ

Max Resistance of protective conductor _____ Ω

Max fault loop impedance _____ Ω and type and size of associated protective device

Type _____

Size _____

Test instrument serial numbers :

Continuity Tester _____

Insulation Resistance Tester _____

Loop Impedance Tester _____

RCD Tester _____

Declaration

I/We the undersigned are responsible for the inspection and testing of the electrical installation described on page 1. of this report.

I/We confirm to the best of my /our knowledge that tests and observations made on pages 1, 2, 3, 4, & _____ represent an accurate assessment within the limits specified, of the condition of the electrical installation.

Inspected & Tested by Signed..... Date.....
(BLOCK CAPITALS).....

PAGE 3 of



N00000000000

Recommendations
As detailed below



Observations and Recommendations (tick boxes as appropriate)		Recommendations As detailed below
(Note subject to the limitations specified on Page 1 of this report)		
☐	NO REMEDIAL WORK IS REQUIRED	
☐	THE FOLLOWING OBSERVATIONS ARE MADE	
SPECIMEN		

* THIS DOES NOT NECESSARILY IMPLY THAT THE ELECTRICAL INSTALLATION INSPECTED IS UNSAFE

_____

9/7 – Periodic inspection and testing

Suggested intervals between periodic tests and inspections	
Type of installation	Max. period between inspections
Domestic premises	5-10 years
Commercial premises	5 years
Educational establishments	5 years
Hospitals	5 years
Industrial premises	3 years
Cinemas	1 year
Places of public entertainment	1 year
Agricultural and horticultural	3 years
Caravans	3 years

9/8 – Periodic inspection and testing

Suggested intervals between periodic tests and inspections	
Type of installation	Max. period between inspections
Caravan sites	1 year
Emergency lighting	1 year
Fire alarm systems	1 year
Laundrettes	1 year
Petrol Filling stations	1 year
Highway power supplies	6 years
Temporary installations	3 months

10 – Questions and answers

