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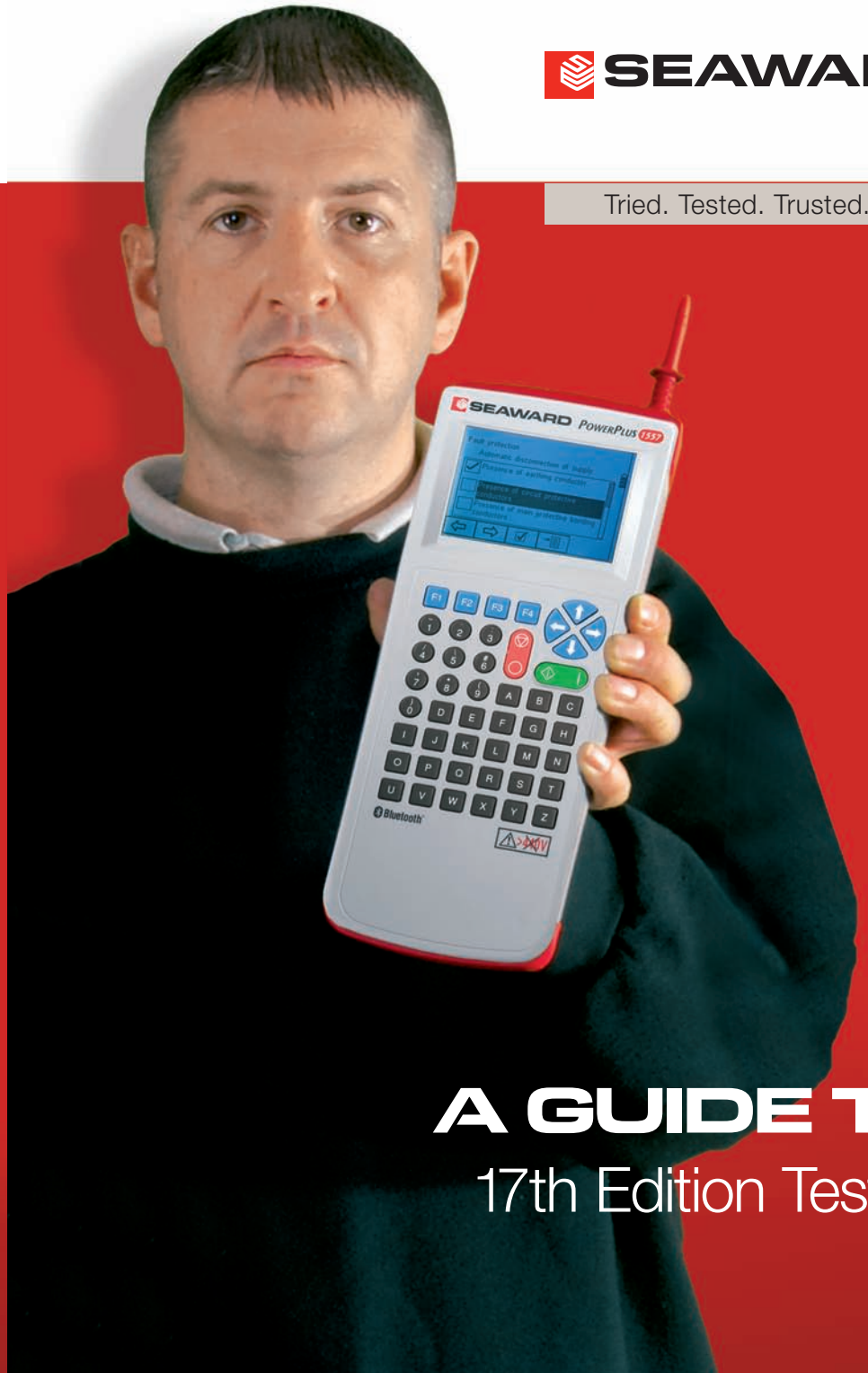

A GUIDE TO
17th Edition Testing

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Contents

INSTALLATION SYSTEMS

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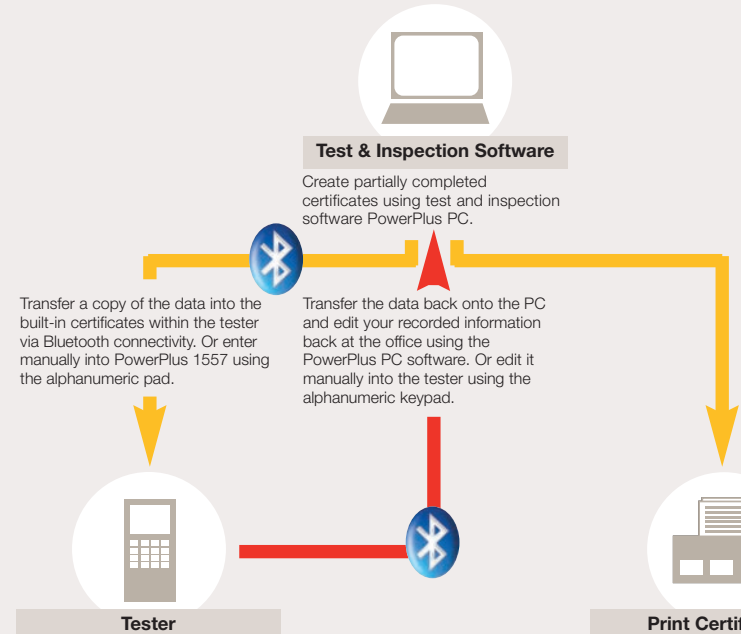


Introduction

Regulation 610.1 of BS 7671:2008 IEE Wiring Regulations Seventeenth Edition requires that every installation shall, during erection and on completion before being put into service, be inspected and tested to verify, so far is reasonably practicable, that the requirements of the Regulations have been met.

Regulation 610.4 states that for an addition or alteration to an existing installation, it shall be verified that the addition or alteration complies with the Regulations and does not impair the safety of the existing installation.

The guidance given in this booklet is divided into two sections, tests carried out before the electrical installation is energized and those carried out with the installation energized.

The tests specified by Regulation should be carried out in the following sequence:

A. Tests before the supply is connected.

1. Continuity of protective conductors including main and supplementary equipotential bonding. (Regulation 612.2.1)
2. Continuity of ring final circuit conductors (Regulation 612.2.2)
3. Insulation Resistance (Regulation 612.3)
4. Polarity (Regulation 612.6)
5. Earth electrode resistance (Regulation 612.7)

B. Tests with the electrical supply connected.

1. Earth fault loop impedance (Regulation 612.9)
2. Check of phase sequence (Regulation 612.12)
3. Functional testing (Regulation 612.13)
4. Verification of voltage drop (Regulation 612.14)

A. Tests before the supply is connected

1. Continuity of protective conductors including main and supplementary equipotential bonding.

Every protective conductor, including circuit protective conductors, the earthing conductor, main and supplementary bonding conductors should be tested to verify that all bonding conductors are connected to the supply earth. Tests are made between the main earthing terminal (this may be the earth bar in the consumer unit where there is no distribution board present) and the ends of each bonding conductor.

The reading obtained at each point should be a low resistance value. *See Diagram 1.*

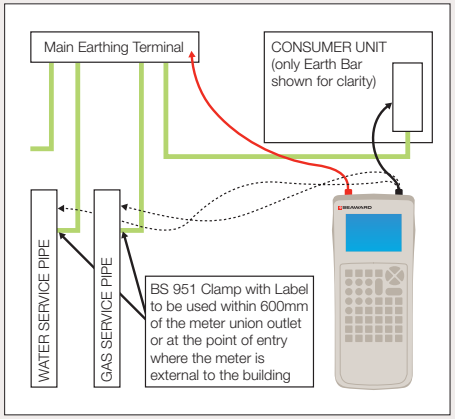


Diagram 1: Continuity of Protective Bonding Conductors

i. Continuity of circuit protective conductors (CPC)

The purpose of this test is to verify that the CPC forms a continuous path around the circuit under test.

The test is carried out (using either or both methods shown) as follows:

Test Method 1:

a) Temporarily link the line conductor to the CPC in the Consumer Unit.

b) Test between the line and the CPC at each accessory point e.g. a ceiling rose, switch or socket outlet.

The reading obtained at each accessory point should be a low resistance value.

The resistance measured at the extremity of the circuit is the sum of the resistances of the line conductor and protective conductor ($R_1 + R_2$) and should be equal to the value obtained by using Tables 9A, 9B, and 9C in the IEE On-site Guide. *See Diagram 2.*

Test Method 2:

Using a long test lead, test between the earth bar in the consumer unit and the CPC at each accessory point.

The reading obtained at each accessory point should be a low resistance value.

The resistance measured at the extremity of the circuit is the resistance of the circuit protective conductor (R_2) and should be equal to the value obtained by using tables 9A, 9B, and 9C in the IEE On-site Guide. *See Diagram 3.*

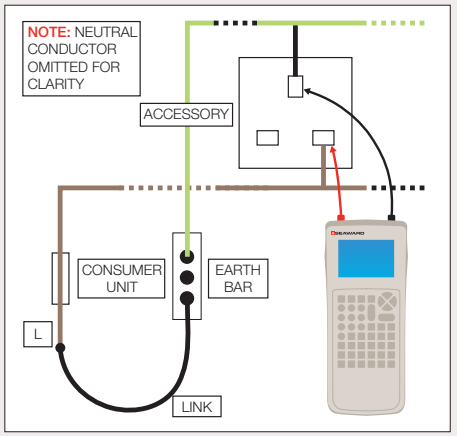


Diagram 2: CPC Test (Method 1)

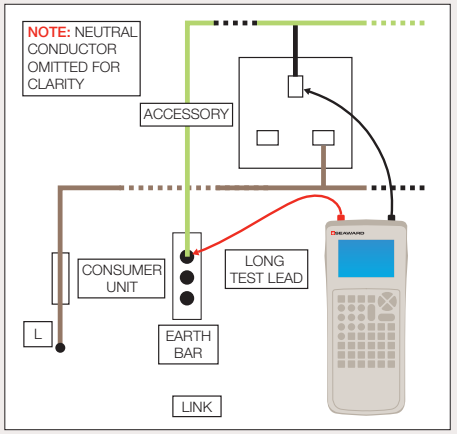


Diagram 3: CPC Test (Method 2)

ii. Continuity of earthing conductor and protective bonding conductors

Using a long test lead, test between the earth bar in the consumer unit and the protective bonding conductor at its furthest end e.g. at the connection to the incoming water, gas or oil service.

The reading obtained at each accessory point should be a low resistance value.

2. Continuity of ring final circuit conductors

The purpose of this three stage test is to verify that :

a) The line, neutral and protective conductors form a continuous path around the circuit.

b) The ring circuit is wired correctly and consists of one loop only i.e. there are no `bridges'.

The tests are carried out as follows:

Stage 1 Confirm that each conductor forms a continuous path around the circuit.

i) Identify the ends of the line, neutral and protective conductors in the Consumer Unit as follows:

Cable 1: L_1, N_1 and CPC_1.
Cable 2: L_2, N_2 and CPC_2.

ii) measure the resistance (r_1) of the line conductor between L_1 and L_2

iii) measure the resistance (r_n) of the neutral conductor between N_1 and N_2

iv) measure the resistance (r_2) of the protective conductor Test between CPC_1 and CPC_2

The readings should be low resistance values and all the same (within 0.05Ω providing that the conductor cross sectional areas (csa) are the same.

In the case of PVC/PVC wiring systems, the CPC is usually smaller than the current carrying conductor csa so the value of r_2 will be larger than r_1 (or r_n) by the ratio of the cross sectional areas.

$r_2 = r_1$ x (csa of r_1) / (csa of r_2) in the case of 2.5mm²/1.5mm², this ratio is 1.67.

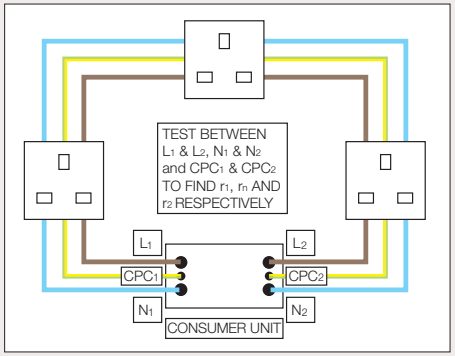


Diagram 4: Stage 1 (carried out in Consumer Unit)

Stage 2 Confirm the absence of bridges in the ring circuit.

i) Identify the ends of the ring circuit conductors in the Consumer Unit as follows:

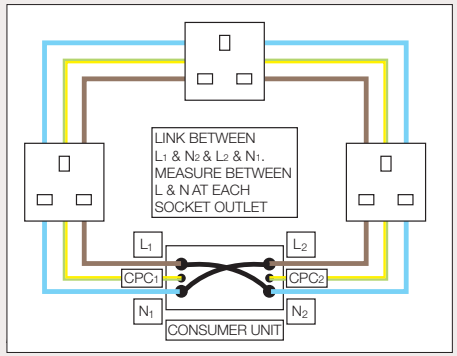
Cable 1: L_1, N_1 and CPC_1.
Cable 2: L_2, N_2 and CPC_2.

ii) Link L_1 to N_2 and L_2 to N_1

iii) Measure the resistance between line and neutral at each socket outlet.

The readings at each outlet should be the same and approximately equal to ($r_1 + r_n$) / 4.

Note: Any sockets wired as spurs will have a higher resistance due to the resistance of the spur.



Stage 3 Confirm the absence of bridges in the ring circuit.

i) In the Consumer Unit link L_1 to CPC_2 and L_2 to CPC_1.
ii) At each socket outlet, measure the resistance between L and CPC.

The reading at each socket outlet should be the same resistance value and should be approximately ($r_1 + r_2$) / 4. The highest value measured is the maximum (r_1+r_2) of the circuit.

Note: Any sockets wired as spurs will have a higher resistance due to the resistance of the spur.

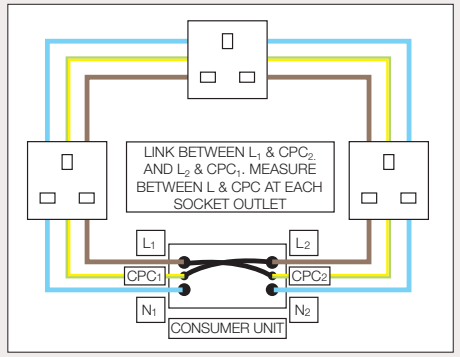


Diagram 6: Stage 3 (carried out at each socket outlet)

3. Insulation resistance

The purpose of the insulation resistance test is to confirm that when all loads have been disconnected, no current carrying paths exist between L and N conductors or between live conductors and CPC, i.e. there is sufficient insulation between the conductors.

The test is carried out in the following manner:

a. Ensure that all loads are disconnected, all fuses are in place and that all switches and circuit breakers are in the ON position. When a circuit contains a two-way switch, insulation tests should be carried out while each of the two switches is operated to ensure that all wiring is tested.

b. Any surge protection devices or other electronic devices that may influence test results or suffer damage from the test voltage must be disconnected before performing an insulation resistance test. If it is not practical to disconnect these devices, a test voltage of 250V dc can be used for the particular circuit but the insulation resistance must be at least 1MΩ.

i) Insulation resistance to earth

Carry out the steps a) and b) above and then measure the insulation resistance between live conductors (line and neutral) and the CPC.

ii) Insulation resistance between live conductors

Carry out steps a) and b) above and then measure the insulation resistance between L and N conductors.

iii) SELV and PELV circuits

Carry out steps a) and b) above and then:

- measure the insulation resistance between SELV and PELV circuits and live parts of other circuits at 500V dc.
- measure the insulation resistance between SELV or PELV conductors at 250V dc and between PELV conductors and protective conductors of the PELV circuit at 250V dc.

The test voltage and minimum insulation resistance values are shown below. In most cases, the measured value will be considerably greater than 1MΩ and the test instrument will indicate over range. See table below.

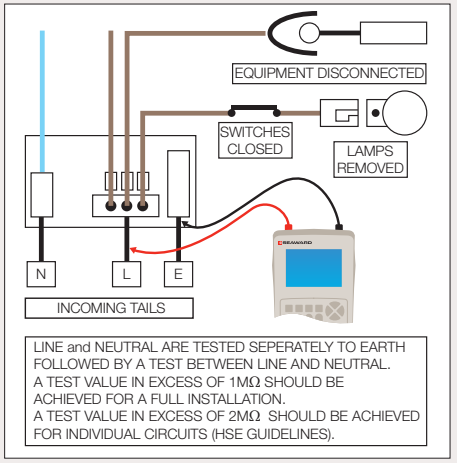


Diagram 7: Insulation Resistance Test

4. Polarity

The polarity test is carried out to verify:

a) That all single-pole switches in lighting circuits are connected into the line conductor.

b) That the centre pins of an Edison Screw (ES) lamp holder are connected to the line conductor.

Circuit nominal voltage	Test voltage (V d.c.	Min. insulation resistance (mΩ)
SELV and PELV	250	0.5
Up to and including 500V with the exception of the above systems	500	1.0
Above 500V	1000	1.0

c) That the correct pin of socket outlets is connected to the line conductor.

The polarity test is carried out as follows :

i) Link the line and the CPC in the Consumer Unit.
ii) Test between the line and CPC at each accessory point.

A satisfactory reading will be indicated by a low resistance value.

The resistance measured at the extremity of the circuit is the sum of the resistances of the line conductor and protective conductor ($R_1 + R_2$) and should be equal to the value obtained by using Tables 9A, 9B, and 9C in the IEE On-site Guide. *See Diagram 8.*

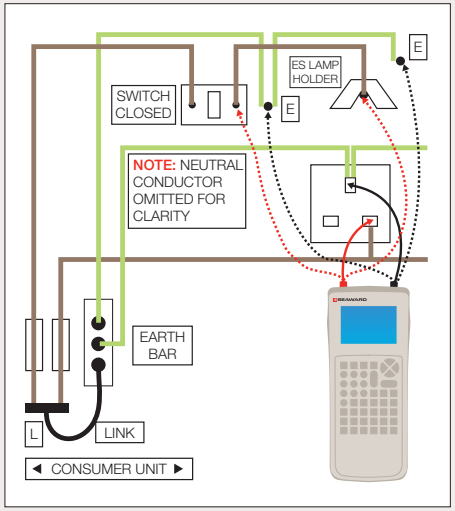


Diagram 8: Polarity Test

5. Earth electrode resistance

Method 1 Three pole measurement

The earth electrode resistance test is used to confirm that the earth electrode provides a satisfactory path to earth. The resistance measurement is made between the earth electrode and test spikes inserted into the ground. The use of a four terminal test instrument such as the Seaward ERT 1557 eliminates the resistance of the test leads.

The E and ES terminals of a four terminal earth resistance tester are connected to the earth electrode, the S terminal to a potential test spike and the H terminal to a second test spike.

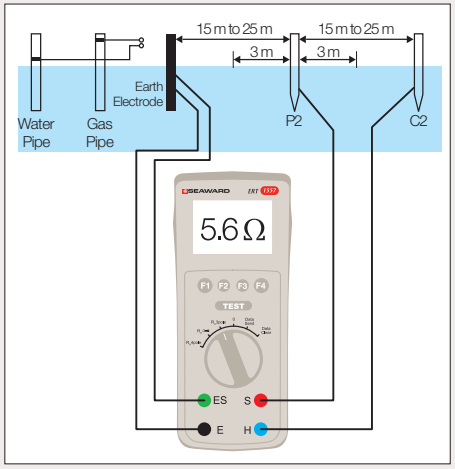


Diagram 9: Three pole earth electrode resistance measurement

The position of the test spikes is important. For best results the distance between the earth electrode and the current spike C2 should be 10 times the maximum dimension of the earth

electrode e.g. 20m for a 2m long electrode.

i. A measurement is made with the potential spike P2 initially positioned midway between the earth electrode and the current spike C2.
ii. The measurement is repeated with the potential spike P2 moved to a position 10% of the earth electrode to current spike C2 distance towards the earth electrode.
iii. The measurement is repeated with the potential spike P2 moved to a position 10% of the earth electrode to current spike C2 distance towards the current spike C2.
iv. The average of the 3 measurements is calculated and the percentage deviation calculated by finding the maximum deviation from the average and expressing this as a percentage of the average.
v. If the percentage deviation is greater than 5%, the measurements should be repeated with a larger separation between the current spike C2 and the earth electrode.

Note: The earth electrode must be disconnected from the installation to avoid measurement errors due to parallel earth paths through bonded parts, for example, water or gas service pipes. Taking the example of an earth electrode with a relatively high resistance to earth, say 1000Ω, and the electrode is connected to a water service pipe with a resistance to earth of say 10Ω. If the earth electrode is not disconnected before attempting to make a measurement, the effect of the parallel path via the water service pipe will be to give an apparent earth electrode resistance of 1000Ω in parallel with 10Ω i.e. 9.9Ω i.e. the high earth electrode resistance is masked by the presence of the parallel path via the water service pipe.

Method 2 Current clamp measurement

Some earth resistance test instruments, such as the Seaward ERT 1557, have a measurement mode which uses an external current clamp to measure the current through the earth electrode. This eliminates the effects of parallel paths and allows measurement of the earth electrode resistance without disconnecting the electrode from the installation. The benefit is that the installation does not need to be shut down in order to measure the earth electrode resistance.

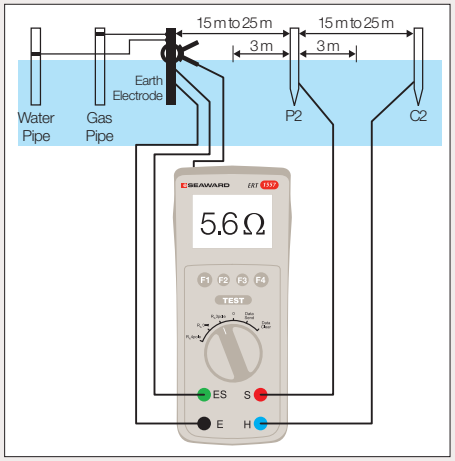


Diagram 10: Earth electrode resistance measurement with current clamp

The measurement technique is as per the three pole method but with the external current clamp placed around the earth electrode. The measured value is the earth electrode resistance.

Note: The earth electrode does not have to be disconnected from the installation when using the current clamp method.

Method 3 Earth loop impedance measurement

If the earth electrode is used in conjunction with an RCD, the earth electrode resistance can be tested by using the following method.

i. Switch off the supply and disconnect the earth electrode from the main earthing terminal.
ii. Connect the loop tester between the line conductor at the source and the earth electrode.
iii. Perform an earth loop impedance test. The measured value is taken as the earth electrode resistance (R_A).
iv. Ensure that the supply is then safely isolated BEFORE the earthing conductor is reconnected to the main earthing terminal.

NOTE: The installation is unprotected against earth faults whilst the earth electrode is disconnected.

Maximum Values of Earth Electrode Resistance for TT Installations

Assuming: 120 V≤ U_O ≤230 V
*U_O is the nominal voltage to earth

RCD rated residual operating $I_{\Delta n}$ (mA)	Maximum value of earth Electrode Resistance R_A (Ω)
30	1667
100	500
300	167
500	100

In practice, values over 200Ω may not be stable as soil conditions change as soil dries or freezes. Thus, 200Ω may be taken as a maximum 'rule of thumb' value.

The tests indicated in this text are the basic safety requirements for an electrical installation (i.e. they must be found to be satisfactory before the supply can be switched on). More comprehensive guidance can be found in BS7671 Requirements for Electrical Installations IEE Wiring Regulations Seventeenth Edition or the IEE On-Site Guide.

HEALTH & SAFETY
REMOVE ALL LINKS WHEN THE TEST SEQUENCE IS COMPLETE AND BEFORE CONNECTING THE INSTALLATION TO THE SUPPLY.

B. Tests with the electrical supply connected

1. Earth fault loop impedance

The earth fault loop impedance is given by:

$Zs = Ze + (R_1+R_2)$

The value of Zs can be found by:

I. measuring the earth fault loop impedance Zs at the furthest point
II. measuring the earth fault loop impedance Ze at the incoming supply and adding (R_1+R_2).
III. taking the earth fault loop impedance Ze provided by the distributor and adding (R_1+R_2).

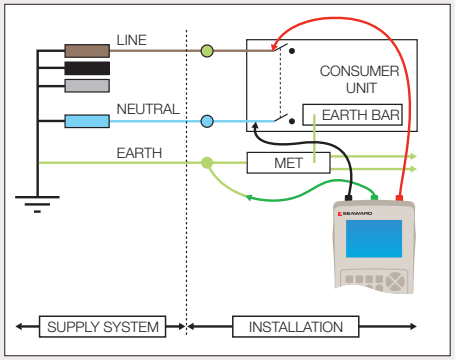


Diagram 11: Measurement of External Earth Loop Impedance Ze

Preparation for the Test

1. Main Switch in the Consumer Unit is switched OFF.
2. Main Earthing Conductor is disconnected from the Main Earthing Terminal (MET) to eliminate any parallel earth paths through equipotential bonding etc.

Test Procedure

1. Select the appropriate range on the test instrument.
2. Connect the test leads between the incoming line side of the Main Switch and the disconnected end of the Main Earthing Conductor.
3. Perform the measurement.
4. The test instrument will automatically display the value of Ze and the corresponding value of the PFC.

On Completion of the Test

REMEMBER TO RECONNECT THE MAIN EARTHING CONDUCTOR TO THE MAIN EARTHING TERMINAL

Type of Earthing System	Maximum Allowable Ze Value (Ω)
TN-C-S	0.36
TN-S	0.80
TT	21.00

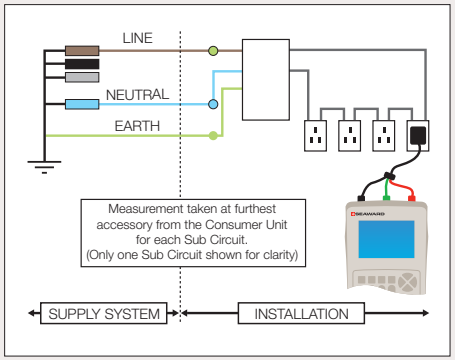


Diagram 12: Measurement of Earth Fault Loop Impedance Zs

Preparation for Testing

1. All power using equipment must be disconnected from sub circuit(s) under test.
2. Main Switch is turned ON i.e. ALL CIRCUITS ARE LIVE

Test Procedure

1. Select the appropriate test instrument range for the measurement of Zs.
2. Connect the test leads between line and earth at the accessory furthest away from the consumer unit. (Alternatively test between line and earth at each accessory point in turn until the maximum value of Zs is obtained).
3. Operate the instrument test button and obtain the value of Zs.

NOTE: Readings obtained using this method may be less than Ze + $(R_1 + R_2)$ because of parallel earth paths. This must be taken into account when comparing the results with design data.

Functional testing

Functional testing requires that the operation of RCDs should be tested and switchgear, controls etc should be functionally tested to verify that they work and are correctly mounted and installed.

2. RCD testing

Preparation for Testing

1. All power using equipment must be disconnected from sub circuit(s) under test.
2. Main Switch is turned ON i.e. ALL CIRCUITS ARE LIVE

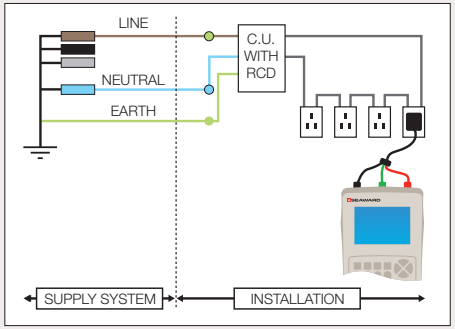


Diagram 13: Measurement of R.C.D Tripping Time

Test Procedure

1. Select the appropriate test instrument range for the measurement of tripping time (mS).
2. Connect the RCD tester to any accessory point (Use the test lead provided with a 13A plug for socket circuits).
3. Operate the instrument test button and obtain the values of tripping times (at 0.5IΔn, IΔn and 5 IΔn where appropriate).
4. Many RCD test instruments have an automatic test sequence which will perform tests at 0.5

Please see over

RCD Type	Rated residual operating current I Δn (mA)	Trip time @ 0.5 I Δn	Trip time @ I Δn (ms)	Trip time @ 5 x I Δn (ms)
General	10	Should not trip	<200	<40
	30			
	100			
	300			
	500			
Delay (Type S)	100		130 - 500	40 - 150
	300			
	500			

Appendix

1. Continuity testing

Continuity testing is used to establish the existence of a current-carrying path. BS 7671 recommends that continuity testing is carried out using a test instrument with an open circuit test voltage between 4V and 24V dc or ac and a short circuit current of not less than 200mA. Test instruments should comply with the requirements of BS EN 61010 and BS EN 61557. Test instruments such as the Seaward IRT 1557, PowerTest 1557 or PowerPlus 1557 can be used to perform continuity tests.

The test instrument provides a test current from the internal battery supply, which circulates through the conductor under test. The test instrument measures the test current and voltage across the circuit under test and displays the resistance of the path between the test probes.

It is recommended that the performance of the instrument is checked before any tests are performed. A basic check can be performed by shorting the test probes together and pressing the test button; the reading on the scale should be almost zero ohms. When the test probes are then disconnected, the reading should indicate beyond the maximum value on the scale.

To perform a continuity test the test leads are connected to the two points in the circuit between which the continuity is being checked.

a) A low reading at the zero end of the scale will indicate a continuous circuit or 'good continuity'

b) A reading above the maximum scale value indicates a broken connection or an 'open-circuit.'

c) A reading lying between a) and b) indicates a high resistance connection somewhere in the circuit. In this case, all connections should be re-checked and the circuit re-tested until the value falls to almost zero ohms.

A continuity test instrument is required for the following tests:

i) Polarity tests
ii) Continuity of circuit protective conductors (CPC)
iii) Continuity of earthing and protective bonding conductors
iv) Ring Circuit Continuity

2. Insulation resistance testing

In a healthy electrical installation, the only electrical connection between phase and neutral conductors will be where loads are situated, for example at lamps, socket outlets or other fixed appliances.

Elsewhere in the installation there should be good electrical isolation between phase and neutral conductors and between current carrying conductors and earth.

If all lamps and appliances are disconnected, there should be an extremely high resistance between phase and neutral, phase and earth, and neutral and earth. An insulation resistance test is used to verify that this 'healthy' condition exists.

BS 7671 requires that an insulation resistance test is carried out with a test instrument capable of producing the dc test voltages shown in the table below. For single phase domestic installations, a 500V insulation resistance test is required. the PowerPlus 1557 and PowerTest 1557 are capable of such tests.
Please see table below.

Before the tests are carried out the tester should be checked in the following manner:

a) Connect the test leads together and press the test button - a reading of zero ohms should be obtained.

b) Disconnect the test leads and press the test button - a reading greater than the largest value on the scale should be obtained.

The 'dead' circuit tests can then be carried out.

Circuit nominal Voltage (V)	Test voltage d.c (V)	Min. insulation resistance (MΩ)
SELV and PELV	250	0.5
Up to and including 500V with the exception of the above systems	500	1.0
Above 500V	1000	1.0

MAXIMUM ALLOWABLE MEASURED VALUES of Zs USING 0.8 'RULE of THUMB' METHOD

MAXIMUM TEST VALUES of Zs in OHMS

Protection Device	Disconnection Time	5A	6A	10A	15A	16A	20A	25A	30A	32A	40A	45A	50A	60A	63A	80A	100A	125A	160A	200A
BS3036	0.4s	7.66			2.04		1.42		0.87											
fuses	5.0s	14.16			4.28		3.06		2.11			1.27		0.89			0.42			
BS88	0.4s		6.82	4.09		2.16	1.42	1.15		0.83										
fuses	5.0s		10.80	5.94		3.34	2.34	1.84		1.47	1.08		0.83		0.66	0.46	0.34	0.26	0.20	0.15
BS1361	0.4s	8.36			2.62		1.36		0.92											
fuses	5.0s	13.12			4.00		2.24		1.47			0.77		0.56		0.40	0.29			
BS1362	0.4s	(3A) 13.12			(13A) 1.94															
fuses	5.0s	(3A) 18.56			(13A) 3.06															
BS3871 MCB Type 1	0.4s & 5.0s	9.27	7.73	4.64	3.09	2.90	2.32	1.85	1.55	1.45	1.16	1.03	0.93		0.74		0.46			
BS3871 MCB Type 2	0.4s & 5.0s	5.30	4.42	2.65	1.77	1.66	1.32	1.06	0.88	0.83	0.66	0.59	0.53		0.42		0.26			
BS3871 MCB Type 3	0.4s & 5.0s	3.71	3.09	1.85	1.24	1.16	0.93	0.74	0.62	0.58	0.46	0.41	0.37		0.29		0.19			
BSEN60898 CB Type B	0.4s & 5.0s	7.42	6.18	3.71	2.47	2.32	1.85	1.48	1.24	1.16	0.93	0.82	0.74		0.59	0.46	0.37	0.30		
BSEN60898 CB Type C	0.4s & 5.0s	3.71	3.09	1.85	1.24	1.16	0.93	0.74	0.62	0.58	0.46	0.41	0.37		0.29	0.23	0.19	0.14		
BSEN60898 CB Type D	0.4s & 5.0s	1.85	1.55	0.93	0.62	0.58	0.46	0.37	0.31	0.29	0.23	0.21	0.19		0.15	0.11	0.09	0.07		

These values are derived by multiplying the relevant tabulated values in BS 7671 (Part 4: Protection for Safety) by a factor of 0.8 (BS 7671: Appendix 14). The values take into account the increase in resistance of the conductors with the increase in conductor temperature due to load current and, therefore, err on the side of safety.

NOTE: BS 3871 MCB Type 3 and BS EN 60898 CB Type C have the same disconnection times for equivalent current ratings.

POWERPLUS 1557

www.seaward.co.uk

SEAWARD
Tried. Tested. Trusted.

The PowerPlus 1557 is the world's first combined test & inspection unit with built-in 17th Edition certificates.

Test Features Keypad

- **First combined test & inspection unit**
  Record test and inspection data directly on the tester, no need for paper or additional PDA devices.
- **Comprehensive Testing**
  Earth continuity, Insulation (100V, 250V, 500V, 1000V), High current & Non-trip loop impedance, Line Impedance, PFC, PSC, RCD trip current, RCD trip time, RCD Auto test sequence, Voltage / Frequency, Phase rotation.
- **High Performance**
  4 readings in 5 seconds at the press of a button; Loop Impedance, Line Impedance, PSC, PFC.
- **Total Accuracy**
  Test results can be checked and validated in the field.

Inspection Features Keypad

- **Built-in 17th edition certificates**
  The only tester to feature fully integrated test certificates for easy, efficient and accurate testing.
- **Future Proof**
  Add new templates as new certificates emerge.
- **No need to enter data twice**
  Data from the in-built certificates is transferred to PC, avoiding the need to type up certificates.
- **Bluetooth download & upload to PC**
  Certificate templates can be loaded using PowerPlus PC software. Field data can be transferred to certificates held on PC.

How the PowerPlus 1557 works

A Previous test or new test?

Either load previous test infomation from a computer via Bluetooth, or start a brand new inspection.

B Start your test & inspection

Start your inspection - the PowerPlus 1557 will recognise the individual tests as you perform them and place the result in the correct field within the in-built 17th Edition Certificate.

C Forget your Look-Up Books

Because the PowerPlus 1557 is intelligent, it recognises individual tests and the result range for each test. This means it validates and checks the result.

D Download test results via Bluetooth

The Bluetooth facility within the PowerPlus 1557 allows for the ultra-fast download of all your test data to a laptop or office computer.

E Print certificates

Because the built-in 17th edition Certificates are completed within the tester, when the information is downloaded, it can be printed straight onto a paper certificate and supplied to the client.

17TH EDITION PRODUCT RANGE

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SEAWARD
Tried. Tested. Trusted.

PowerTest 1557
The only installation Tester to feature an integral probe

Boasting an integrated probe, you can hold and read the PowerTest 1557 at the same time. It's also fast, performing an earth loop, line loop, PFC and PSC test in under 5 seconds! With a simple turn of the knob, test for: Earth Continuity, Insulation (100v, 250v, 500v), Non Trip Loop Impedence, Line Impedence, PSC, PFC, RCD Trip line, RCD Trip current and voltage / frequency measurement.

Features include:

- 17th Edition compliant
- Reading at eye level
- Loop test in 5 seconds
- 4 measurements from 1 test
- Auto RCD test
- Long battery life

PowerCheck 1557
A complete instrument verification system

The PowerCheck 1557 is a full instrument verification system in one rugged, drop-proof enclosure. It has full instrument verification against all relevant standards and confirms performance between verifications. It tests for Full Earth Continuity, Insulation Resistance, RCD Trip Time, RCD Trip Current and Loop Verification.

Features include:

- Rugged and robust
- Tests to BS 7671 / EN 61557
- Confirms performance
- NICEIC & IET compliant
- Colour coded for ease of use
- Compatible with all testers

IRT 1557
Insulation Resistance and Continuity Tester

Handheld, with the unique integrated safety probe, it's a superb addition to any test engineer's toolkit. Automatic discharge of capactive circuits gives you automatic warning of the presence of hazardous voltages. With an easy to use rotary setting switch, it offers unique features, including voltage measurements up to 1000AC or DC and a dual safety rating.

Features include:

- Handheld
- Lightweight
- Long Battery life
- Large backlit LCD
- 17th Edition and Part P compliant
- Continuous test mode

ERT 1557
A high specification Earth Resistance Tester

Suitable for use on 110V, 230V and three phase electrical systems, this lightweight unit provides accurate earth electrode resistance measurement without disconnecting the electrode. It can also measure soil resistivity. Earth resistance measurement is carried out using 2, 3 and 4-wire method. It is one of the most competitive earth resistance testers on the market.

Features include:

- Current clamp measurement
- Earth resistance measurement
- Battery powered
- Download to PC
- Store up to 500 records
- 2, 3 or 4 wire measurement

PowerPlus PC
Produce 17th Edition Certificates faster

The PowerPlus PC is a test & inspection software program designed to work best in conjunction with the PowerPlus 1557 installation tester. The PowerPlus PC software allows you to select from a range of installation certificates, enter installation details including certificate number, and upload to the PowerPlus 1557 tester. Once complete, the data is transferred from the tester to the software using Bluetooth.

Features include:

- Complete certificates faster
- Certificate validation
- Upload / download to Powerplus 1557
- Direct input of certificate infomation
- Intelligent data system

PowerGuard 2
Comprehensive certificate software

PowerGuard Pro 2 is ideal for creating test and inspection certificates. You can capture and store test information and go on to produce professional certificates which comply with Part-P and 16th/17th Edition Regulations. PowerGuard Pro Mobile 2 allows you to enter certificate information such as test and inspection results and circuit details direct into your PDA - giving you the freedom and flexibility to work smarter.

Features include:

- Easy set-up wizard
- Auto validation
- Email PDF certificates
- Create certificate templates
- Certificates check in/out