



SAFE ELECTRIC Newsletter



AECI are holding their Annual Electrical Trade Show on Thursday 1st September 2016 at the Red Cow Moran's Hotel Dublin from 10am to 8pm. Admission is FREE OF CHARGE. It is an excellent opportunity for Electrical Contractors, Wholesalers, Architects, Engineers, Facility Managers and Electricians to see the most advanced Products and Services available. There will also have demonstrations and seminars on the day. The opening speaker will be Pierce Martin, General Manager of Safe Electric (RECI). ALL ARE WELCOME.

Audit Non Conformance Issues

Common problems inspectors are coming across when carrying out routine annual audit inspections are:

- Test equipment not available for inspection.
- Test equipment not calibrated.
- Rule book not available or latest amendments not available.
- Test sheets not available or incorrectly filled.
- Certs not available or incorrectly filled in.
- QC number expired.

Please ensure that you have all of the above in order at all times. You will then avoid any future penalties that may be imposed on you due to Non Compliance.

IMPORTANT

Please ensure that your Qualified Certifiers Number is valid. Your certificate cannot be processed if your number is expired.

AECI's Annual Electrical Trade Show

We will have a stand at the AECI's Annual Electrical Trade Show on Thursday 1st September 2016 at the Red Cow Moran's Hotel Dublin. We will have technical staff and inspectors available through out the day to answer any questions and inform you of the latest Safe Electric and CER news.



Sincere sympathy is extended to Mattie Ryan and family on the recent passing of his wife, Anne.

Mattie is the current chairman of RECI (Safe Electric).

RECI AGM

The 2016 Annual General Meeting of RECI was held in the Red Cow Morans Hotel on the 2nd July. Thank you to all who attended.

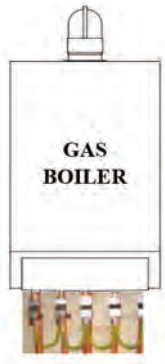
We're on the Web!
www.reci.ie



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Electrical Cross Bonding at a Domestic Boiler




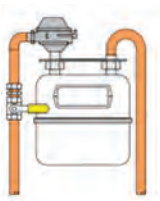
Concerns have been raised by the RGII regarding bonding of gas boilers. The concern is that if a boiler has to be replaced, when the pipe work is disconnected then a potential risk may exist. **Please loop** all pipe work (10mm preferred) to remove any possibility of a potential difference in the event of boiler replacement.

ETCI Rule requirements.

544.1.1 Main bonding conductors shall connect extraneous conductive parts of the main engineering services in a building such as pipe-work for gas, water and central heating and ducting for air conditioning, to the main earthing terminal.

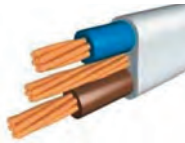
544.1.2 For conductive parts originating outside the building, the bonding connections shall be made as close as practicable to their points of entry to the building.

544.1.5 A permanent label inscribed "SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE" shall be permanently affixed at each main bonding connection. 



544.1.6 In the case of mains gas services, the main electrical bonding connection shall be made on the consumer's side of the gas meter (and flexible pipe), but not in the meter box or enclosure. Where the mains gas service is of metal and does not contain an insulating piece, a main bonding connector shall interconnect the metal pipe work on either side of the gas meter (and flexible pipe).

Note: When making this connection, the bonding conductor should first be connected to the customer's side other meter, and then connected to the mains side.

Please be aware that we are again coming across 16.0mm² PVC/PVC cable with 6.0mm² earth cable, this is unacceptable for 'Mains Tails'. The rules require a minimum of 10mm² earth. This cable has appeared on the market over the past number of months. Please check prior to installation. 



Please ensure if you have multigang switches with more than one circuit present that a warning notice is fitted to comply with the following rule:

Rule 537.5.5 Wall-mounted switches

A wall mounted switch assembly connected to more than one circuit shall be provided with an appropriate permanent, indelibly marked warning notice, which may be affixed inside the enclosure.

Please be aware if you undertake controlled works you are required to issue Cert no 3. A copy of the cert along with a copy of a completed "Test Record Sheet" **MUST** be returned to Safe Electric. **Please comply.**

Frequently Asked Questions

Q1 - I am wiring a new house and the customer has told me that they intend to build a press around where I am planning to locate my distribution board. Is this ok?

A. Rule 530.5.4 states that a distribution board shall not be located in a storage cupboard.

If the distribution board ends up in a storage cupboard then the installation will not comply with the wiring rules thus cannot be certified. Please ensure that you make this clear to your customer when you are deciding on a location for a distribution board.

Q2 - I am wiring a shop and some of the displays have 230 volt light fittings on them. Do these require RCD Protection?

A. Yes, Rule 559.9 states that lighting on a display stand must be protected against electric shock using an RCD not exceeding 30mA, or SELV

Q3 - Does a non standard socket for a table lamp require RCD protection (usually 5A type)?

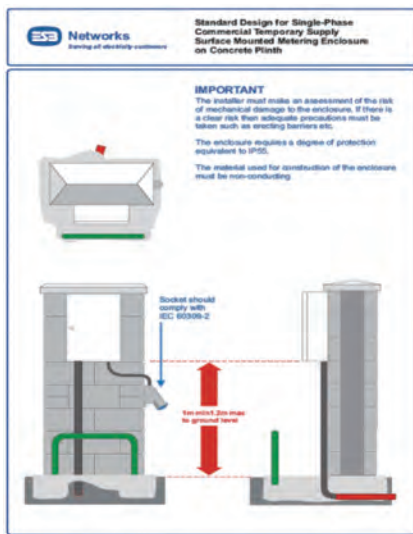
A. Yes, rule 554.5.1 states socket-outlets intended solely for the connection of standard lamps or table lamps require RCD protection.

Q4 - Does geo-thermal or Air to water heating systems in a domestic installation require RCD protection?

A. Yes, Rule 555.3.2 States that water heating appliances, a circuit supplying auxiliary equipment associated with water services and water systems (e.g. pumps) shall be protected by an RCD having a rated residual operating current not exceeding 30mA.

Q5 - I am wiring external lighting and plan to run the underground cables in a black hydrodare pipe is this ok?

A. No, Rule 714.514.03 states: Ducting of materials other than concrete and containing cables shall be coloured red.



Domestic One-Off House Connections

As a result of a high percentage of non-compliance with the requirements for temporary supplies and the consequential concern for public safety, Safe Electric will no longer accept temporary domestic wiring certificates.

If a customer insists on getting a connection for construction purposes, they will have to apply for a Temporary Builders/Commercial connection. This connection will have to be at the boundary of the site (not the permanent domestic metering cabinet location) and will have to conform to interface standards for Temporary connections (see diagram). The customer will be charged Commercial tariffs for this service.

Safe Electric Roadshows

The following venues and dates have been planned for the Safe Electric roadshows:



Venue	Date
Talbot Hotel, On the Quay, Co Wexford	Thursday 29th September 2016
Claregalway Hotel, Claregalway Village, Co Galway	Wednesday 5th October 2016
Clarion Hotel, Clarion Road, Sligo, Co Sligo	Wednesday 12th October 2016
The Anner Hotel, Dublin Road, Thurles, Co Tipperary	Wednesday 19th October 2016
Four Seasons Hotel, Coolshannagh, Monaghan, Co Monaghan	Wednesday 2nd November 2016
City North Hotel, Gormanston, Co Meath	Wednesday 9th November 2016
Mullingar Park Hotel, Dublin Road, Mullingar, Co Westmeath	Wednesday 16th November 2016

Roadshow Topics

- Understanding Insulation Resistance Testing
- Procedure for obtaining temporary power to a new domestic installation.
- Certification Procedures
- Completing and returning Test Record Sheets
- Notice of Potential Hazard procedure
- Audit & Inspection procedure
- Latest CER requirements for working on existing Distribution Boards
- Change of Contractor and Certification Procedures
- Rule clarification of common questions asked on ET101 National Wiring Rules (Current Edition)
- Question and answer session.

Please note there is no requirement to book into these Information evenings and there is no charge. The talks will start at 7.00pm sharp with teas, coffees and biscuits served at 6.30pm.

Why does a Cert that I submit get returned?

Unfortunately we sometimes have to return Certificates to RECs as they are incorrectly filled. Please ensure all of the required information is correctly completed. Check all boxes are filled in as required.

5 most common reasons why certificates gets refused/returned.

National Rules for Electrical Installations
Completion Certificate for an Installation
with a Maximum Import Capacity < 50kVA

REGISTERED CONTRACTOR

† MPRN No. 1 0 1 2 3 4 5 6 7 8 9 Serial No. 000001

CUSTOMER NAME (Block Capitals): John Smyth

ADDRESS OF INSTALLATION (Block Capitals): No 7 St John's Terrace, Dublin Road, Castlebar, Co Mayo

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

Date of Installation: 20th June 2016

✓ 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 17 Socket Outlets 32 Fixed Appliance Outlets 7

TEST RESULTS

POLARITY AND EARTHING OF ALL OUTLETS VERIFIED (a tick indicates yes) MAIN EQUIPOTENTIAL BONDING VERIFIED FOR: YES NA

GAS	<input checked="" type="checkbox"/>
WATER	<input checked="" type="checkbox"/>
OTHER (specify see details)	<input checked="" type="checkbox"/>

TESTS (please insert values)

RESISTANCE OF PROTECTIVE CONDUCTOR (max) 0.27 Ω INSULATION RESISTANCE (min) 78 MΩ

DETAILS OF TESTS ETC., ARE GIVEN IN TEST RECORD SHEET NO. 65

† See Chapter 63 "National Rules (ET101)" Associate Sub System Certificate Numbers Yes* No

* NA means Not Applicable *See comment box for details

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

COMMENT OR DETAILS:

REGISTERED CONTRACTOR (Block Capitals)

Name: Mr Sporky

Address: Somewhere

Tel: 086 12345 Reg No. A 1 1 1 1

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: xxxxxxxx For Electrical Installation: Constructor Tester

Qualification: Electrician Certifier's No. QC 1234/022019 Date: 14th July 2016

POST CONNECTION RESULTS

MAX FAULT LOOP IMPEDANCE 0.82 Ω RATING & TYPE OF THE ASSOCIATED PROTECTIVE DEVICE 20A 'B' MCB

OPERATION OF ALL RCDS VERIFIED

30 mA RCD Max Trip Time @ 30mA	31	ms	Shower
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: xxxxxxxx For Electrical Installation: Constructor Tester

Qualification: Electrician Certifier's No. QC 1234 Date: 12th August 2016

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 is not responsible for the electrical installation or for the accuracy of the information given on this certificate. Electrical installations should be inspected periodically. © ETCI 2009 This document must not be re-produced in any form or manner without the express permission of the Electro-Technical Council of Ireland.

MPRN Number missing or incorrect

The MPRN Number is an 11 digit number issued by the ESB. This number is required in order to log the certificate onto the electronic system.

Polarity and Earthing of all outlets verified not ticked

This box must be ticked in **all** cases even the works are meter tails upgrade. The polarity and earthing must be verified.

Main Equipotential Bonding Verified

A tick must be inserted stating either YES or NA (3 ticks required)

Test Record Sheet Number missing

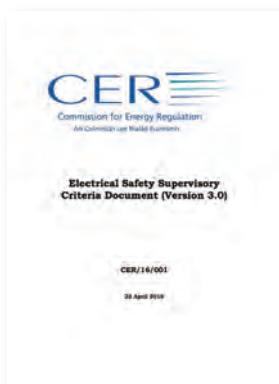
A test record sheet **MUST** be completed for every installation with the required values being transferred onto the cert. You will then need to allocate a number to the test sheet and record it on the cert. The latest version of the 'Test Record Sheet' have the numbers pre-printed.

QC Number missing or expired

A QC number must be inserted here. You need to monitor your own number to ensure it is valid. RECs who obtained a QC through Safe Electric (RECI) can see the expiry date in the last 6 digits of the QC number (example shown is Feb 2019)

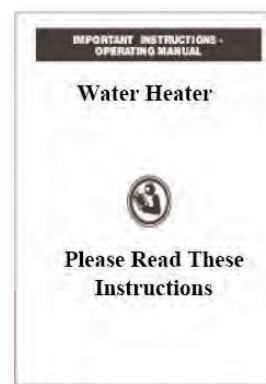
The POST Connection part of the cert **MUST** be returned within 35 days of the installation being energised. If you are using the electronic version please ensure post connection results are input. If you chose to ignore this requirement with no good reason, then you may be blocked from issuing further certs.

On the 22nd of April this year the CER released an update of the Electrical Safety Supervisory Criteria Document (Version 3) This document is available via our website and we would urge you all to read it.



Rule 134.1.1 States that ‘Electrical equipment shall be in stalled in accordance with the instructions provided by the manufacturer of the equipment’.

Please ensure while following the manufactures instructions that you are still in compliance with ET101 wiring rules. Also ensuring that the manufactures instructions are suitable for this country.



The ETCI Technical Committee produced the 2nd Edition of ET214 Guide to the Selection and Use of Residual Current Devices in 2013. This document is available via free download from the ETCI website. The Guide is intended to provide guidelines for the selection, installation and use of Residual Current Devices (RCDs). The Guide is likely to be of benefit to electrical contractors, specifiers, and persons wishing to gain a wider understanding of the use of RCDs. The Guide is intended to provide specifiers, installers and users of RCDs with a better understanding of the application, selection and use of such products. However, it is important to note that this publication is intended for use as a guide only, and has no regulatory or statutory status. This Guide should therefore be used in conjunction with the

current issue of the National Rules for Electrical Installations (ET101), relevant product standards, and I.S. EN 61439:Low Voltage Switchgear and Control Gear Assemblies, where applicable.



Historically domestic installations only used equipment that generated full wave AC residual currents. Safe Electric inspectors are still coming across domestic appliances that also generate pulsating DC residual currents.

Some appliances have thyristor DC drives or rectifiers generating DC in the circuit. Washing machines/dishwashers are an example. We are finding that some installation manuals require that an ‘A’

type RCD/RCBO is fitted. If an ‘AC’ type is fitted then it may not operate correctly due to the presence of DC.

ET101 states that ‘AC’ type RCDs are for use only in domestic and similar installations. RECs should consider the type of loading of each circuit. Safe Electric recommend that in domestic installations, socket circuits are protected by an ‘A’ type RCDs/ RCBO. This will help ‘future proof’ the installation. Further information to aid the correct selection of an RCD/RCBO can be found in ET214:2013 and also rule 531 of ET101. The RCD is there to protect life, please ensure the correct device is used.

RCD/RCBO Markings

AC Type 

A Type 

The image shows a 'TEST RECORD SHEET (Continuation)' form. It is a grid-based form with columns for 'CIRCUIT DETAILS', 'TEST RECORD SHEET', and 'TEST CONNECTIONS'. The 'CIRCUIT DETAILS' section includes fields for 'Circuit Designation', 'Cable', 'Circuit Protection', and 'Circuit Type'. The 'TEST RECORD SHEET' section includes fields for 'Max Circuit Current (Amps)', 'Max RCD Operating Time (ms)', and 'Max RCD Operating Time (ms)'. The 'TEST CONNECTIONS' section includes fields for 'Test Record Sheet No.', 'Serial No.', 'Cable No.', 'Wiring No.', and 'Date'. There are also sections for 'Signature', 'QC No.', 'Page No.', and 'Date' for both the 'Pre Connection Tested By' and the 'Post Connection Tested By'.

Continuation Sheets for Test Record Sheets

Due to the requirement of Test Record Sheets being in a triplicate format, we are obviously unable to use the back of the sheet to record readings. So we have produced ‘Continuation Sheets’ to make the paperwork more efficient. Please contact the office to place your order if required.

Accredited Verification & Certification Course Providers

Listed below are course providers you can contact to obtain a QC number

METAC Ltd, Mountrath Enterprise Park, Portlaoise Road, Mountrath, Co. Laois.

Tel: 057 8756540 **Email:** info@metac.ie

iSkill Training, 12A & B Bluebell B/Park, Old Naas Road, Dublin 12. **Tel:** 01 4242440 **Email:** info@iskill.ie

Solas (Fas), Baldoyle Industrial Estate, Baldoyle, Dublin 13. **Tel:** 01 8167400 **Email:** info@solas.ie

ECSSA, Coolmore House, Park Road, Killarney, Co. Kerry. **Tel:** 064 6637266 **Email:** info@ecssa.ie

Future Skills Ireland Ltd, 47B Keeper Road, Drimnagh, Dublin 12.

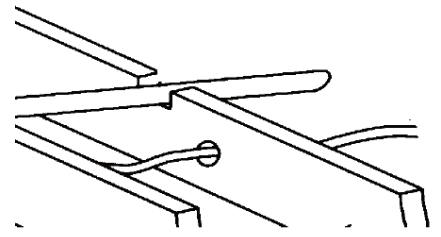
Tel: 01 5324058 **Email:** info@futureskillsireland.ie

Holes and Notches in Joists

Please ensure that you are not compromising the structural integrity of any joist that has to be drilled or notched, you must ensure that any notches and holes made are in 'safe areas' as shown below. Making holes or notches outside these areas may seriously weaken the structure and may become dangerous. The diagram below shows where notches and holes are in compliance with Part 'A'

of the Building Regulations (1.1.2.5) and also the IS444 and can be made without affecting the strength of the joist significantly.

Holes or notches made in a joist will weaken it, avoid making them if possible, even if it means re-routing cables. If this is not possible please follow the requirements below. Note: Drilling or



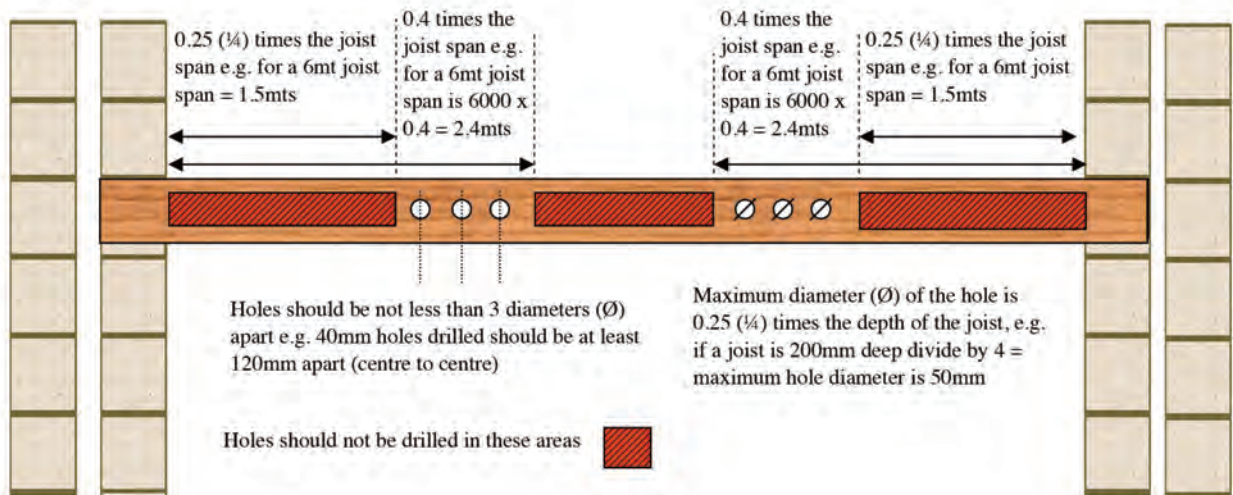
notching outside these limits should be designed by an engineer.

1.1.2.5 Notches and holes in simply supported floor and roof joists should be within the following limits:

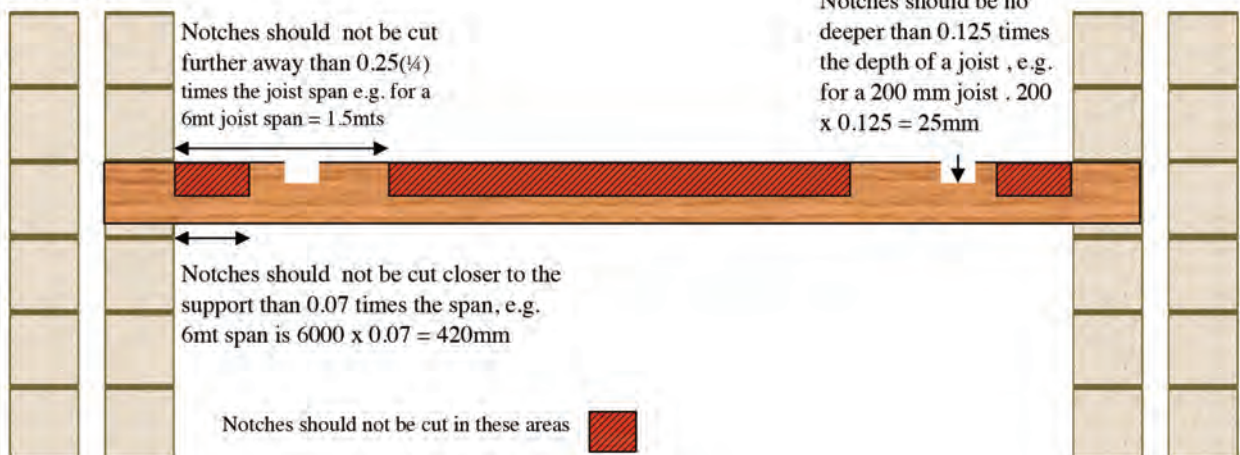


- notches should be no deeper than 0.125 times the depth of a joist and should not be cut closer to the support than 0.07 times the span, nor further away than 0.25 times the span,
- holes should be no greater diameter than 0.25 times the depth of the joist, should be drilled at the neutral axis, should be not less than three diameters (centre to centre) apart and should be located between 0.25 and 0.4 times the span from the support, and
- the horizontal distance between any hole and any notch should not be less than the depth of the joist.

HOLES



NOTCHES



Cables in Solid Walls




Please ensure that you comply with the rule below. If cables in solid walls are running either vertically or horizontally to an accessories as shown on the drawing below, then the use of PVC conduit to protect cables from concrete/plaster is suitable. If cables do run outside the 'Safe Zones' then additional earthed mechanical protection is required. This is to protect the cables from impact in the future, someone drilling to hang a picture or hang curtains etc. The rule deals with cable locations and not chase depths etc. Please ensure that whoever carries out your chasing work is aware of this.

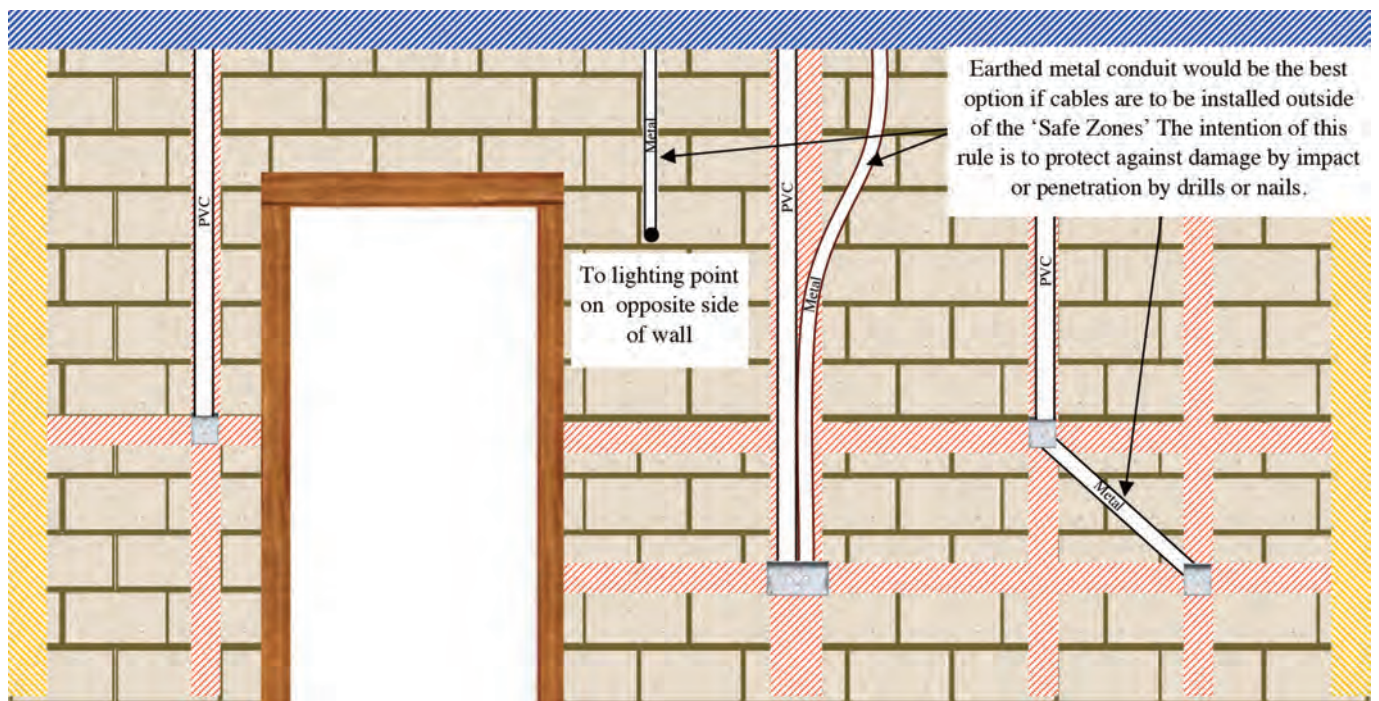
Please refer to 'Part A' (Section 1.1.3.21) of the building regulations for permissible chase requirements. Basically vertical chase should be no more than 30mm deep, so watch out for back to back chases. Chases should not impair the stability of the wall. Although cable routes are shown on the drawing below, horizontal chases should be avoided (unless approved by an engineer) as they can seriously weaken the structure if not in compliance with Part 'A' (1.1.3.21) of the Building regulations and the National Annex to I.S. EN 1996-1-1.



ETCI RULE-522.6.4 Wiring embedded in solid walls

Wiring embedded in solid walls or in unbattened dry-lined walls shall be protected by an earthed metal screen, armouring, metal conduit or trunking, against damage by impact or penetration by drills or nails except where the following two conditions apply:

- a) The distance measured horizontally between the wiring and the reverse side of the wall is not less than 50 mm.
- b) The wiring is installed:
 - in a straight vertical or horizontal run going directly to a point, accessory or switchgear mounted on a wall, or 
 - within a vertical distance of 150 mm from a ceiling, or 
 - within a horizontal distance of 150 mm from a corner formed by two adjoining walls. 



ETCI Rule Reminder: If you install an RCD-RCBO into an installation please ensure that a notice is affixed, in a location clearly visible to the user (on the front of the distribution board). In the absence of this notice the user may be totally unaware of the importance of testing the life saving device. The installation of this label is YOUR responsibility. Please do not ignore or forget!

Rule 531.2.2.2 RCDs shall be installed so that the test-device is easily accessible. In addition to any marking on the RCD, a notice to the effect that the test-device should be operated regularly by the user shall be given on a label, and placed on the RCD or in the vicinity of the RCD. This notice shall be clearly visible to the user.

Guide Table to calculate Re when carrying out 'Rp + Re' method of 2.5mm Twin and Earth

Rp+Re	Re	Length
0.1	0.06	5.3
0.11	0.07	5.8
0.12	0.08	6.3
0.13	0.08	6.8
0.14	0.09	7.4
0.15	0.09	7.9
0.16	0.10	8.4
0.17	0.11	8.9
0.18	0.11	9.5
0.19	0.12	10.0
0.2	0.13	10.5
0.21	0.13	11.1
0.22	0.14	11.6
0.23	0.14	12.1
0.24	0.15	12.6
0.25	0.16	13.2
0.26	0.16	13.7
0.27	0.17	14.2
0.28	0.18	14.7
0.29	0.18	15.3
0.3	0.19	15.8
0.31	0.19	16.3
0.32	0.20	16.8
0.33	0.21	17.4
0.34	0.21	17.9
0.35	0.22	18.4
0.36	0.23	18.9
0.37	0.23	19.5
0.38	0.24	20.0
0.39	0.24	20.5
0.4	0.25	21.1
0.41	0.26	21.6
0.42	0.26	22.1
0.43	0.27	22.6
0.44	0.28	23.2
0.45	0.28	23.7
0.46	0.29	24.2
0.47	0.29	24.7
0.48	0.30	25.3
0.49	0.31	25.8
0.5	0.31	26.3
0.51	0.32	26.8
0.52	0.33	27.4
0.53	0.33	27.9
0.54	0.34	28.4

Rp+Re	Re	Length
0.55	0.34	28.9
0.56	0.35	29.5
0.57	0.36	30.0
0.58	0.36	30.5
0.59	0.37	31.1
0.6	0.38	31.6
0.61	0.38	32.1
0.62	0.39	32.6
0.63	0.39	33.2
0.64	0.40	33.7
0.65	0.41	34.2
0.66	0.41	34.7
0.67	0.42	35.3
0.68	0.43	35.8
0.69	0.43	36.3
0.7	0.44	36.8
0.71	0.44	37.4
0.72	0.45	37.9
0.73	0.46	38.4
0.74	0.46	38.9
0.75	0.47	39.5
0.76	0.48	40.0
0.77	0.48	40.5
0.78	0.49	41.1
0.79	0.49	41.6
0.8	0.50	42.1
0.81	0.51	42.6
0.82	0.51	43.2
0.83	0.52	43.7
0.84	0.53	44.2
0.85	0.53	44.7
0.86	0.54	45.3
0.87	0.54	45.8
0.88	0.55	46.3
0.89	0.56	46.8
0.9	0.56	47.4
0.91	0.57	47.9
0.92	0.58	48.4
0.93	0.58	48.9
0.94	0.59	49.5
0.95	0.59	50.0
0.96	0.60	50.5
0.97	0.61	51.1
0.98	0.61	51.6
0.99	0.62	52.1

Rp+Re	Re	Length
1	0.63	52.6
1.01	0.63	53.2
1.02	0.64	53.7
1.03	0.64	54.2
1.04	0.65	54.7
1.05	0.66	55.3
1.06	0.66	55.8
1.07	0.67	56.3
1.08	0.68	56.8
1.09	0.68	57.4
1.1	0.69	57.9
1.11	0.69	58.4
1.12	0.70	58.9
1.13	0.71	59.5
1.14	0.71	60.0
1.15	0.72	60.5
1.16	0.73	61.1
1.17	0.73	61.6
1.18	0.74	62.1
1.19	0.74	62.6
1.2	0.75	63.2
1.21	0.76	63.7
1.22	0.76	64.2
1.23	0.77	64.7
1.24	0.78	65.3
1.25	0.78	65.8
1.26	0.79	66.3
1.27	0.79	66.8
1.28	0.80	67.4
1.29	0.81	67.9
1.3	0.81	68.4
1.31	0.82	68.9
1.32	0.83	69.5
1.33	0.83	70.0
1.34	0.84	70.5
1.35	0.84	71.1
1.36	0.85	71.6
1.37	0.86	72.1
1.38	0.86	72.6
1.39	0.87	73.2
1.4	0.88	73.7
1.41	0.88	74.2
1.42	0.89	74.7
1.43	0.89	75.3
1.44	0.90	75.8

Rp+Re	Re	Length
1.45	0.91	76.3
1.46	0.91	76.8
1.47	0.92	77.4
1.48	0.93	77.9
1.49	0.93	78.4
1.5	0.94	78.9
1.51	0.94	79.5
1.52	0.95	80.0
1.53	0.96	80.5
1.54	0.96	81.1
1.55	0.97	81.6
1.56	0.98	82.1
1.57	0.98	82.6
1.58	0.99	83.2
1.59	0.99	83.7
1.6	1.00	84.2
1.61	1.01	84.7
1.62	1.01	85.3
1.63	1.02	85.8
1.64	1.03	86.3
1.65	1.03	86.8
1.66	1.04	87.4
1.67	1.04	87.9
1.68	1.05	88.4
1.69	1.06	88.9
1.7	1.06	89.5
1.71	1.07	90.0
1.72	1.08	90.5
1.73	1.08	91.1
1.74	1.09	91.6
1.75	1.09	92.1
1.76	1.10	92.6
1.77	1.11	93.2
1.78	1.11	93.7
1.79	1.12	94.2
1.8	1.13	94.7
1.81	1.13	95.3
1.82	1.14	95.8
1.83	1.14	96.3
1.84	1.15	96.8
1.85	1.16	97.4
1.86	1.16	97.9
1.87	1.17	98.4
1.88	1.18	98.9
1.89	1.18	99.5
1.9	1.19	100.0

This useful chart can quickly help you find the resistance of the protective conductor (Re) for **2.5mm twin and earth**.

Check the meter reading obtained with the left hand column (Rp+Re in Ohms) and the middle column will give you the resistance of the protective conductor (Re in Ohms) The right hand side column gives the approx length (metres) of cable based on the resistance readings.

Please use this table to verify the readings obtained when testing.

Note: 'Re' readings have been rounded up to 2 decimal points.

