Electrical® Safety Professional

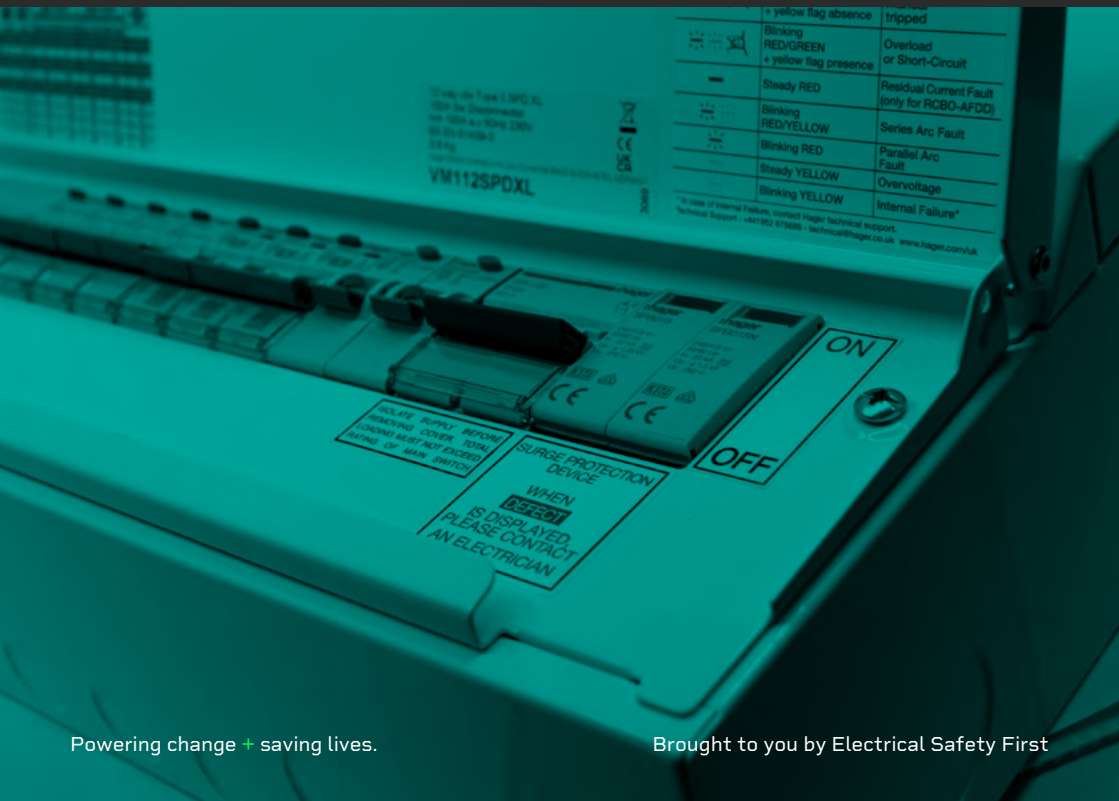
BEST PRACTICE GUIDE

REPLACING A CONSUMER UNIT IN RESIDENTIAL AND SIMILAR PREMISES

1

ISSUE 5.1

electricalsafetyfirst.org.uk



Powering change + saving lives.

Brought to you by Electrical Safety First

BEST PRACTICE GUIDE 1: ISSUE 5.1

Electrical Safety First is indebted to the following organisations for their contribution and/or support to the development of this Guide:

In electronic format, this Guide is intended to be made available free of charge to all interested parties. Further copies may be downloaded from the websites of some of the contributing organisations.

The version of this Guide on the Electrical Safety First website (electricalsafetyfirst.org.uk) will always be the latest.

Feedback on any of the Best Practice Guides is always welcome - email: *enquiries@electricalsafetyfirst.org.uk*

Electrical Safety First is supported by all sectors of the electrical industry, approvals and research bodies, consumer interest organisations, the electrical distribution industry, professional institutes and institutions, regulatory bodies, trade and industry associations and federations, trade unions, and local and central government.

Electrical Safety First

Published by:
Electrical Safety First
45 Great Guildford Street, London SE1 0ES
Email: *enquiries@electricalsafetyfirst.org.uk*
Website: *electricalsafetyfirst.org.uk*

Electrical Safety First and other contributors believe that the guidance and information contained in this Best Practice Guide is correct, but all parties must rely on their own skill and judgement when making use of it.

Neither Electrical Safety First nor any contributor assumes any liability to anyone for any loss or damage caused by any error or omission in this Guide, whether such error or omission is the result of negligence or any other cause. Where reference is made to legislation, it is not to be considered as legal advice. Any and all such liability is disclaimed.

The latest versions of all the Best Practice Guides are available from electricalsafetyfirst.org.uk

AESM
aesm.uk.com

BEAMA
beama.org.uk

British Gas
britishgas.co.uk

BSI Product Services
bsigroup.com

City & Guild
cityandguilds.com

EAL
eal.org.ukz

ECA
eca.co.uk

Institution of Engineering and Technology
theiet.org

LCL Awards
lclawards.co.uk

NAPIT
napit.org.uk

NICEIC
niceic.com

SELECT
select.org.uk

SPACES
thespaces.org.uk

REPLACING A CONSUMER UNIT IN RESIDENTIAL AND SIMILAR PREMISES

The aim of this Guide is to promote best practice by providing practical advice and guidance for designers, installers and inspectors where the consumer unit or other main switch-gear is being replaced in residential or similar premises wired in accordance with earlier versions of *BS 7671* or the *IEE Wiring Regulations.* The guidance is intended to protect users and installers against dangerous situations that could arise from the existing installation.

The guidance recognises that the existing circuits being connected to a replacement consumer unit may not comply with the current edition of *BS 7671*, as amended. In following the guidance in this Guide, the installer accepts this and must be satisfied that all new work on a particular installation addresses the risks.

A consumer unit need not be replaced simply because it has rewireable fuses, cartridge fuses or older-type circuit-breakers, as these devices can provide satisfactory overcurrent protection. Furthermore, a consumer unit need not be replaced because it does not incorporate RCD protection, as there may be ways to provide this protection other than replacing the consumer unit. Similarly, in light of the changes made in Amendment No 3 of *BS 7671*: 2008, a consumer unit need not be replaced because its enclosure is made of combustible materials such as, for example, plastic. See also ***Best Practice Guide No 4***: *Electrical Installation Condition Reporting - Classification Codes for Domestic and Similar Electrical Installations.*

CONTENTS

1. SCOPE & LEGAL REQUIREMENTS

This guidance is intended for residential and similar premises and applies to the replacement of a consumer unit or similar assemblies complying with BS EN 61439-3, the reconnection of existing circuits and the connection of any new circuits installed during the work.

There is no legal requirement that calls for an existing installation to be upgraded to current standards.

However, there is a requirement under the *Building Regulations for England and for Wales* to leave the installation and the building no worse in terms of the level of compliance with other applicable parts of Schedule 1, which gives requirements with which building work must comply, than before the work was undertaken.

Similarly, the Scottish Building Standards Technical Handbooks, which provide guidance on achie-ving the standards set out in the Building (Scotland) Regulations 2004, as amended, require that any work associated with the replacement of a service, fitting or equipment by another of the same general type is to a standard no worse than at present.

Replacing a consumer unit in domestic premises in England or Wales is notifiable work under the Building Regulations. Unless the work is undertaken by a person registered with an electrical self-certification scheme prescribed in the regulations, notification of the proposals to carry out the work must be given to the appropriate building control body before the work begins, or, where the work is necessary because of an emergency, the building control body should be notified as soon as possible after the completion of the work.

Installers are reminded of the need to comply with the relevant parts of the *Electricity at Work Regulations 1989* when replacing a consumer unit. In particular, attention is drawn to:

- Regulation 12, Means for cutting off the supply and for isolation;
- Regulation 13, Precautions for work on equipment made dead;
- Regulation 14, Work on or near live conductors.

These regulations mean that, unless a suitable isolating switch has been provided on the supply side of the consumer unit for this purpose, arrangements will need to be made with the Distribution Network Operator (DNO) for the cut-out fuse to be withdrawn, in order to disconnect the incoming supply for the purpose of isolation and afterwards for reconnection. Guidance on safe isolation procedures is given in ***Best Practice Guide No 2***.

Result of DIY work by a home owner where a 10.5 kW electric shower was connected to a 45 A circuit-breaker using 2.5 mm² cable. (Photo courtesy of British Gas).

2. REQUIREMENTS OF BS 7671

Replacing a consumer unit is an alteration to that installation. Additions and alterations are classed as new work. The work must therefore be designed, erected and verified in accordance with the requirements of the current edition of *BS 7671,* as amended *(Regulation 110.1.2(vii))* and must not impair the safety of the existing installation *(Regulation 641.5)*. On completion of the verification of the work an Electrical Installation Certificate must be issued *(Regulation 644.1)*.

BS 7671 does not require existing circuits to be upgraded. However, the circuit protection may require upgrading.

However, circuits that are defective or non-compliant with the requirements of *BS 7671* in a way that would result in immediate or potential danger **must** not be reconnected to the consumer unit.

Note: See exception for distress change - section 4.

Where a consumer unit is being replaced, the following are recommended:

- All circuits are protected by Type A RCBOs (531.3.2 (ii) or sufficient type A RCDs (531.3.2 (i) & 531.3.3);
- AFDDs are installed in areas identified as of higher risk (421.1.7) on socket circuits with a current not exceeding 32A;
- SPDs are installed in locations required by regulation group 443.4.

We would also recommend that the benefits of installing a Grade D (mains powered fire detection and alarm system (if not already installed) are fully explained to the client.

A consumer unit must not be replaced until it has been established that the rating and condition of any existing equipment, including that of the distributor, will be adequate for the altered circumstances, and the earthing and bonding arrangements necessary for the safety of the alteration are adequate (Regulation 132.16).

Where practical, a replacement consumer unit with additional capacity for future circuits and other technologies (solar PV, EV charging, battery storage) should be considered.

Any defects found in the reconnected circuits that would not result in immediate or potential danger should be ideally rectified but if the client is not willing, they must be recorded in the Comments on existing installation section of the Electrical Installation Certificate (EIC) issued for the replacement of the consumer unit.

*Note. Guidance on classification codes attributable to damage, defects and noncompliances is given in **Best Practice Guide No 4.***

3. MAIN EARTHING, MAIN PROTECTIVE BONDING AND METER TAILS

The installer must verify, as a minimum, that:

a) The main earthing terminal of the installation is connected to an adequate means of earthing via a suitably sized earthing conductor, (see notes 1, 2 and 5).

b) The main protective bonding is adequate, (see notes 3 and 5).

c) The installation has adequate earthing arrangements for fault protection purposes.

d) The meter tails and the distributor's equipment have adequate current-carrying capacity (see notes 4 and 5).

e) The polarity of the incoming supply is correct.

Notes:

1. *A measurement of the external earth fault loop impedance (Ze) should be carried out at this stage if practicable.*
2. *A 6mm² or 10 mm² earthing conductor used with an associated line conductor of 25 mm² could be considered adequate if the requirements of Regulation 543.1.3 are met.*
3. *A 6 mm² main protective bonding conductor size could be deemed adequate where the minimum size required by Regulation 544.1.1 of BS 7671 is 10 mm², if the bonding conductors have been in place for a significant time and show no signs of thermal damage.*
4. *16 mm² meter tails with a 100 A cut-out fuse could be adequate if the maximum demand of the installation (taking into account diversity and load profile) does not exceed the current-carrying capacity of the tails, and also provided that the requirements of Regulation 434.5.2 for protection of the tails against fault current are met.*
5. *Some electricity distributors have requirements regarding the earthing conductor, main protective bonding conductors and meter tails that exceed the requirements of BS 7671. Local requirements should be confirmed before starting work.*
6. *If any of conditions 5.1.a), b), c), d) or e) are not met, the customer should be informed that upgrading is required. If the customer refuses, the installer should **not** proceed with the replace-ment of the consumer unit until the necessary remedial work is undertaken.*

If any of conditions in a), b), c), d) or e) are not met, the customer should be informed that upgrading is required. If the customer refuses, the installer should **not** proceed with the replacement of the consumer unit until the necessary remedial work is undertaken.

4. REASON FOR CHANGE

The replacement of a consumer unit could be a planned change or a distress change.

Planned change

The initial approach of the contractor planning the replacement of the consumer unit should be to strongly recommend the customer to have an Electrical Installation Condition Report (EICR) prepared on the installation, in advance of the consumer unit being replaced.

If the customer refuses an EICR, a pre-work survey must be undertaken before any work is carried out to ascertain if there are any immediate or potential dangers, or if there is any condition that would cause unwanted tripping of an RCD in the existing installation affected by the change. If the customer refuses a pre-work survey the replacement of the consumer unit should not go ahead.

As a minimum the survey should include:

- Making enquiries with the user as to whether there are any known defects, faults or damage;
- An internal visual inspection of the existing consumer unit to determine, amongst other things, the type and condition of the wiring system used for the installation;
- An external visual inspection of readily accessible parts of the installation, a measurement of the external earth fault loop impedance (Ze);
- A test of circuit protective conductor continuity at the end of each final circuit;
- A test of earth fault loop impedance at readily accessible socket-outlets;
- An insulation resistance measurement of the whole installation at the consumer unit, between the live conductors interconnected and the protective conductor connected to the earthing arrangement.

If any condition that would present an immediate danger, potential danger, or cause the unwanted tripping of an RCD is found, the customer should be informed that remedial work is necessary to improve safety;

*Note: For lighting circuits having no protective conductor and lead-sheathed and rubber insulated cables see Sections * & *.*

The consumer unit should not be replaced unless:

- Any defects that would present an immediate danger, potential danger,or cause the unwanted tripping of an RCD are corrected, or;
- The defective circuits are left disconnected from the replacement consumer unit.

Note: Immediate danger corresponds to one or more observations that would warrant a code C1 classification. Potential danger corresponds to one or more observations that would warrant a code C2 classification. Guidance on classification codes attributable to damage, defects and non-compliances found during a periodic inspection is given in ***Best Practice Guide No 4.***

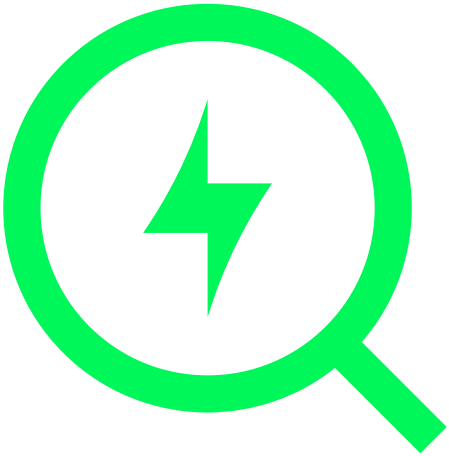
Distress change

A distress change occurs when the consumer unit has suffered damage, has become unusable through overheating, or is in a dangerous condition with exposed live parts. This situation usually requires immediate replacement of the consumer unit. However, the installation of the consumer unit must still comply with the requirements of the current edition of *BS 7671*, as amended. This means, amongst other things, that requirements a), b), c) and d) referred to in Section 3 must be met.

In all cases, a pre-work survey should be carried out to ascertain if there are any immediate dangers, or if there is any condition that would cause unwanted tripping of an RCD in the existing installation affected by the change.

It should be explained to the occupant before the consumer unit is replaced that, if an immediately dangerous condition is found in an existing final circuit, it would not be possible to reconnect that circuit until any necessary remedial action is carried out. If remedial action is not possible the circuit would need to be isolated. Additionally, any potential dangers identified would need to be remedied without delay after the Consumer Unit replacement.

Note: It is recommended that a record of the customer's agreement to the above is obtained and suitably recorded.



5. INSPECTION, TESTING AND CERTIFICATION

The alteration or additions themselves (the installation of the replacement consumer unit and any other new work, such as additional final circuits) should be verified fully in accordance with the requirements of Section 641 of *BS 7671*, as amended, and an Electrical Installation Certificate (EIC), including schedules of inspection, circuit details and test results, based on the models in Appendix 6 of *BS 7671*, should be given by the installer to the customer (Regulations 644.1 and 644.3).

As a minimum, the following tests should be carried out on the existing circuits connected to the replacement consumer unit:

- A test of the continuity of the protective conductor of each circuit, to the point or accessory electrically furthest from the consumer unit and to each accessible exposed conductive-part;
- A test of the continuity of ring final circuit conductors on all ring final circuits;
- A measurement of the combined insulation resistance of all the circuits in the installation. The measurement need only be made between the line and neutral conductors connected together and the protective conductor connected to the earthing arrangement, to avoid potential damage to any electronic components;
- A confirmation of the supply polarity;
- A test to establish the fault loop impedance (Zs), at each accessible socket-outlet and at least one point or accessory in every other circuit, preferably the point or accessory electrically furthest from the consumer unit;
- A test of each installed RCD (RCCB or RCBO) using both a test instrument and the device's integral test button.

The EIC should identify, in the *Comments on existing installation* section, any defects which exist in the reconnected circuits.

If a full Electrical Installation Condition Report (EICR) on the installation has not been provided as part of the work, consideration should be given by the installer to stating this on the certificate with a strong recommendation that an EICR should be carried out.

6. LIGHTING CIRCUITS HAVING NO PROTECTIVE CONDUCTOR

This guidance recognises that unearthed lighting circuits do not comply with *BS 7671.*

In homes built before 1966, the Wiring Regulations current at that time did not require a protective conductor to be taken to every lighting point and related accessory, as is the case nowadays. However, with the increased use of Class 1 fittings and the probability of changes being made that would impair the effectiveness of the applied protective measure of double or reinforced insulation {412.1.2) this non-compliance should **not** be ignored.

A lighting circuit having no protective con ductor should **not** be reconnected unless:

- It is rewired with cables having a protective conductor, or;
- A circuit protective conductor is provided with a means of connection available at all accessible points of that circuit.

Where the customer will not agree to one of the remedial measures described above, the customer should be advised that the circuit cannot be reconnected unless they agree to have all associated metallic or Class I fittings or accessories present replaced by all-insulated or Class II alternatives.

As an absolute last resort and only where the customer will not agree to either the provision of a protective conductor for the circuit or the replacement of all metallic or Class I fittings or accessories by similar items of Class II construction, the risk assessment detailed in Annex B may be applied, with all testing carried out with the supply to the consumer unit in question safely isolated.

Subject to the recommendations of this Guide being met, where lighting circuits having no circuit protective conductor are connected to a new consumer unit, it is strongly recommended that a warning notice with black letters on a yellow background should be fixed on or adjacent to the consumer unit.

WARNING: Circuit(s) Nos.xxxx do not have provision for earthing metal equipment.

TO AVOID RISK OF ELECTRIC SHOCK, DO NOT REPLACE INSULATED LIGHTING FITTINGS OR SWITCHES WITH METAL LIGHTING FITTINGS OR SWITCHES.

The inspection, testing and certification of Section 5 of this Guide must be met.

7. LEAD SHEATHED AND RUBBER INSULATED CABLES

In all cases where lead-sheathed or rubber-insulated cables are encountered, it is strongly recommended that the consumer unit should not be changed until the cables are replaced. This is because an unacceptable level of deterioration of the insulation is likely to occur whilst the cables are handled during removal of the old consumer unit and their re-termination into the replacement consumer unit and subsequent testing. Consideration for the renewal of cables should also take into account the requirements for earthing the lead sheath.

8. REFERENCES TO OTHER BEST PRACTICE GUIDES

This Best Practice Guide makes reference to the following Best Practice Guides, which may be downloaded from the websites of some of the contributing organisations. The version on the Electrical Safety First website will always be the latest.

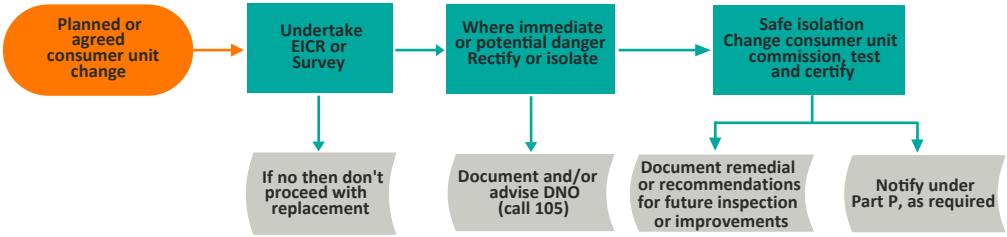
www.electricalsafetyfirst.org.uk/professional-resources/best-practice-guides

- **Best Practice Guide No 2 –** Guidance on management of electrical safety and safe isolation procedures for low voltage installations;
- **Best Practice Guide No 4 –** Electrical installation condition reporting: Classification codes for residential and similar electrical installations.

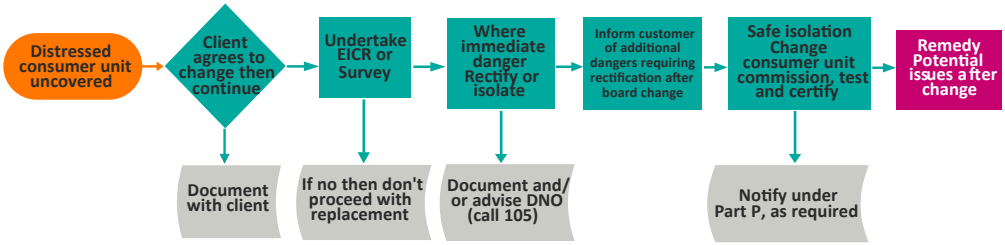
ANNEX A

CONSUMER UNIT REPLACEMENT – FLOWCHARTS

Planned Replacement (Section 4).



Distress Replacement (Section 4).



ANNEX B

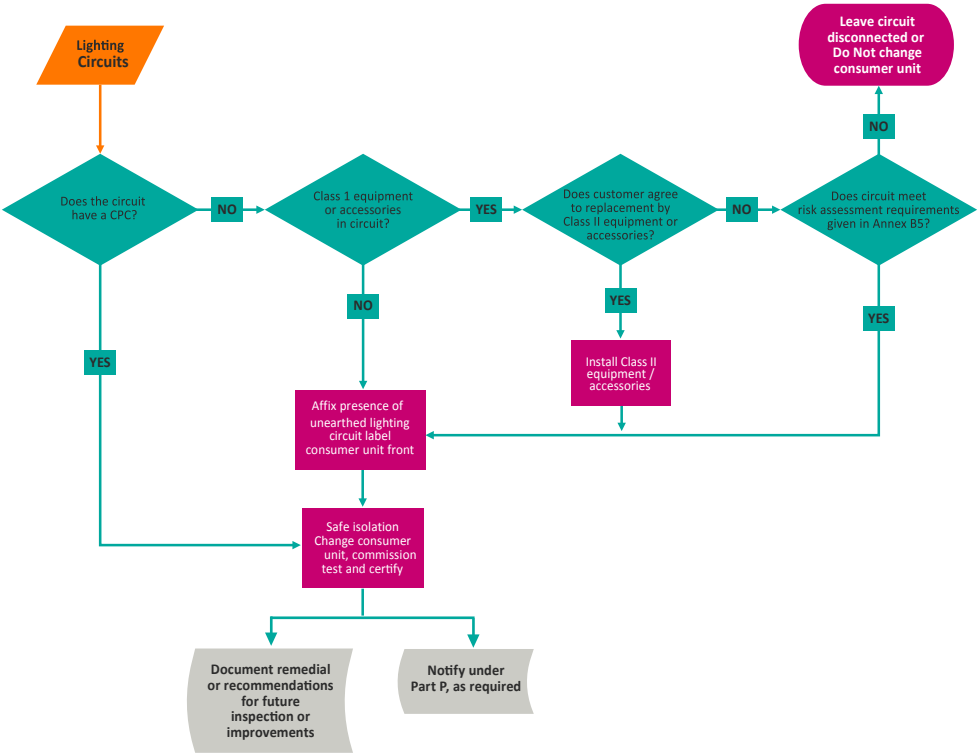
Risk assessment testing for a lighting circuit having no protective conductor with metallic or Class I fittings or accessories.

As an absolute last resort and only where the customer will not agree to either the provision of a protective conductor for the circuit or the replacement of all metallic or Class I fittings or accessories by similar items of Class II construction, the following risk assessment may be applied, with all testing carried out with the supply to the consumer unit in question safely isolated:

1. Carry out a continuity test applied between the earthing terminal in the existing consumer unit and all Class I light fittings and metal plate accessories. If the resistance value is 1 Ω or less, the equipment may be considered to be earthed.
2. An insulation resistance test should be applied between the live conductors (line and neutral connected together) and the earthing terminal in the consumer unit, with that terminal connected to the means of earthing. The resistance should be at least 1 MΩ.
3. An insulation resistance test should be applied between line and neutral connected together and the exposed-conductive-parts of every Class I lighting fitting and metal switch plate found to not be earthed by the continuity testing described in 1. above. The insulation resistance value should be at least 1 MΩ.
4. If the circuit does not fulfill the requirements of either 2. or 3. adjacent, there would be a risk of electric shock if the circuit were to be re-energised. The customer must be advised in writing that this danger exists, and that the circuit must be disconnected from the supply and should not be connected into a new consumer unit.
5. If the customer will not agree to this risk assessment being carried out, they should be advised that a lighting circuit having no protective conductor that has metal or Class I switches, light fittings or other accessories fitted is potentially dangerous (and so would warrant a Code C2 classification in an Electrical Installation Condition Report). This will mean that the circuit cannot be connected into a new consumer unit (see Section 2 of this Guide).
6. It should be noted that the protective measure double or reinforced insulation is only applicable to electrical installations or circuits therein that are under effective supervision in normal use to ensure that no change is made that would impair the effectiveness of the protective measure (Regulation 412.1.2). Domestic and similar premises falling within the scope of this Guide cannot be considered to be under effective supervision.
7. Subject to the recommendations of Annex B being met, where lighting circuits having no protective conductor are connected to a new consumer unit, it is strongly recommended that a warning notice with black letters on a yellow background should be fixed on or adjacent to the consumer unit (see Section 6).

8. On completion of the work a record of any non-compliances, including the lack of protective conductors on the lighting circuits, must made in the Comments on existing installation section of the electrical installation certificate issued to cover the work.

Annex B: Flowchart – Lighting circuits with no cpc.



NOTES:

NOTES:

NOTES:

NOTES:

Electrical®
Safety
Professional

Electrical Safety First is the UK charity dedicated to reducing deaths and injuries caused by electrical accidents. Our aim is to ensure everyone in the UK can use electricity safely.

Electrical Safety First
45 Great Guildford Street,
London, SE1 0ES

electricalsafetyfirst.org.uk
enquiries@electricalsafetyfirst.org.uk

Registered Charity (England and Wales)
No. 257376
(Scotland) No. SC039990

Access all our Best Practice Guides and other free resources for electricians at electricalsafetyfirst.org.uk