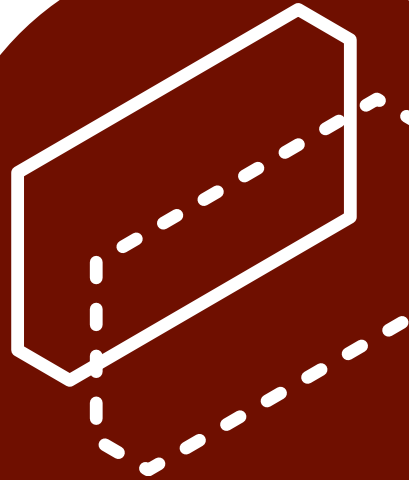


Best Practice Guide



**Replacing a consumer
unit in domestic and
similar premises**

Issue 4

Best Practice Guide

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Electrical Safety First
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Email: enquiries@electricalsafetyfirst.org.uk
Website: www.electricalsafetyfirst.org.uk

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Replacing a consumer unit in domestic and similar premises

1. Aim

- 1.1. The aim of this Guide is to promote best practice by providing practical advice and guidance for designers, installers, verifiers and inspectors where the consumer unit or other main switchgear is being replaced in domestic or similar premises wired in accordance with earlier versions of the current edition of BS 7671. The guidance is intended to protect users and installers against dangerous situations that could arise from the existing installation.
- 1.2. 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.
- 1.3. A consumer unit need not be replaced simply because it has rewirable fuses, cartridge fuses or older-type circuit-breakers, as these devices

can provide satisfactory overcurrent protection. Further, 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



2. Limitation

2.1. This guidance applies only to the replacement of a consumer unit, the reconnection of existing circuits and the connection of any new circuits installed during the work.

3. Legal requirements

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

3.2. 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 to the Building Regulations than before the work was undertaken. (Schedule 1 gives the requirements with which building work must comply).

3.3. Similarly, the Scottish Building Standards Technical Handbooks, which provide guidance on achieving the standards set 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.

3.4. 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 completion of the work.

3.5. 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.

3.6. 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 for the cut-out fuse to be withdrawn in order to disconnect the incoming supply for the purpose of isolation. 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)

4. Requirements of BS 7671

- 4.1. 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(vi)) and must not impair the safety of the existing installation (Regulation 610.5). On completion of the verification of the work an Electrical Installation Certificate must be issued (Regulation 644.1).
- 4.2. BS 7671 does not require existing circuits to be upgraded to current standards in order for them to be connected to the outgoing ways of the replacement consumer unit.
- 4.3. 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.
- 4.4. Where a consumer unit is being replaced, additional protection by means of RCDs in accordance with Regulation 415.1 must be provided to the extent required by the current edition of BS 7671, as amended, such as for:
- socket-outlets (Regulation 411.3.3)
 - mobile equipment for use outdoors (Regulation 411.3.3)
 - cables concealed in floors, ceilings, walls or partitions (Regulations 522.6.201 to 203 as appropriate)
 - low voltage circuits serving a location containing a bath or a shower or passing through the zones of the location ((Regulation 701.411.3.3).
 - AC final circuits supplying luminaires

- 4.5. Circuits that are to be provided with RCD protection must be divided between a sufficient number of RCDs or otherwise designed as necessary to avoid hazards and minimise inconvenience in the event of a fault (Regulations 314.1 and 314.2).
- 4.6. 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).
- 4.7. Any defects found in the reconnected circuits that would not result in immediate or potential danger must be recorded in the Comments on existing installation section of the Electrical Installation Certificate issued for the replacement of the consumer unit.

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

5. Main earthing, main protective bonding and meter tails

- 5.1. 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), and
 - c) The meter tails and the distributor's equipment have adequate current-carrying capacity (see notes 4 and 5).
 - d) The polarity of the incoming supply is correct.

Notes:

1. A measurement of the external earth fault loop impedance (Z_e) 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.

5.2. If any of conditions 5.1.a), b), c) or d) 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.

6. Reason for change

6.1. The replacement of a consumer unit could be a planned change (see Section 6.2.) or a distress change (see Section 6.3.).

6.2. Planned change

6.2.1. The initial approach of the contractor planning the replacement of the consumer unit should be to encourage the customer to have an Electrical Installation Condition Report prepared on the installation in advance of the consumer unit being replaced.

6.2.2. If the customer refuses, a pre-work survey should be 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. 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 other readily accessible parts of the installation,
- a measurement of the external earth fault loop impedance (Z_e),
- 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 and
- an insulation resistance measurement of the whole installation at the consumer unit, between the live conductors connected together and the protective conductor connected to the earthing arrangement.

6.2.3. 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:

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 on-compliances found during a periodic inspection is given in Best Practice Guide No 4.

6.2.4. Depending on the extent, the remedial work could involve considerable additional cost, not only in installing new cables or accessories, but also in the renewal of decorations, unless the customer is willing to accept surface wiring.

6.2.5. If the customer is unable, or not prepared to accept the cost of the remedial works, but still requires a new consumer unit to be installed, the installer needs to carry out a risk assessment as described in section 7 of this Guide.

6.3. Distress change

6.3.1. 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 5.1. must be met.

6.3.2. 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 will not be possible to reconnect that circuit until the necessary remedial action is carried out, and it will be necessary to return to the installation to carry out any further work that would have been required had the replacement of the consumer unit been planned. This further work, where required, must be carried out without delay.

Note:

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

7. Risk assessment

7.1. As stated in Section 6.2.5. where it is proposed to replace a consumer unit but the customer is unable or unwilling to accept either the cost or disruption of remedial works, a risk assessment should be undertaken. This is for the purpose of advising the customer as to the level of risk that would exist on completion of the proposed work. A disclaimer does not absolve the installer from responsibility.

7.2. In all cases, the initial approach should be to encourage the customer that remedial action should be taken to correct or remove any immediate danger, potential danger or condition that would cause unwanted tripping of an RCD.

7.3. The risk assessment requires inspection and testing (except to the extent that these have already been carried out as part of the Electrical Installation Condition Reporting or any pre-work survey).

7.4. The inspection and testing is necessary to establish, for the circuits concerned, at least whether or not there are:

- a) any immediate dangers (observations that would warrant a code C1 classification in an Electrical Installation Condition Report),
- b) any potential dangers (observations that would warrant a code C2 classification in an Electrical Installation Condition Report), or
- c) any lighting circuits that do not have a circuit protective conductor (cpc).
- d) any circuits wired using lead sheathed or rubber insulated cables.

8. Action following risk assessment

- 8.1. If the risk assessment indicates that there are no immediately dangerous conditions and no potentially dangerous conditions, the replacement of the consumer unit may proceed.
- 8.2. If any immediately dangerous conditions or potentially dangerous conditions are indicated the consumer unit should not be replaced unless:
- the defects are corrected, or
 - the defective circuits are left disconnected from the replacement consumer unit.
- 8.3. If there are any lighting circuits that do not have a protective conductor, the recommendations of Section 10 of this Guide should be followed.
- 8.4. If there are any circuits wired in lead sheathed or rubber insulated cables, the recommendations of Section 11 of this Guide should be followed.

9. Inspection, testing and certification

- 9.1. 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, together with schedules of inspection and schedules of 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).

- 9.2. 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. 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 polarity,
- A test to establish the fault loop impedance (Z_s), 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.

Note: Testing of each RCD using both a test instrument and the integral test facility in the device should have been carried out under Section 9.1 of this Guide.

- 9.3. The Electrical Installation Certificate should identify, in the *Comments on existing installation* section, any defects which exist in the reconnected circuits for which improvement is recommended (observations that would warrant a code C3 classification in an Electrical Installation Condition Report). If a full Electrical Installation Condition Report 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 recommendation that a Condition Report should be carried out.

10. Lighting circuits having no protective conductor

- 10.1. This guidance fully recognises that unearthed lighting circuits do not comply with BS 7671.
- 10.2. 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.
- 10.3. It is strongly recommended that a lighting circuit having no protective conductor 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.
- 10.4. Where the customer will not agree to one of the remedial measures described in Section 10.3. of this Guide 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.
- 10.5. Risk assessment testing for a lighting circuit having no protective conductor with metallic or Class I fittings or accessories**
- 10.5.1. 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:
- 10.5.2. 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 1Ω or less, the equipment may be considered to be earthed.
- 10.5.3. 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 M Ω .
- 10.5.4. 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 Section 10.5.2. The resistance should be at least 1 M Ω .
- 10.5.5. If the circuit does not fulfil the requirements of either 10.5.3 or 10.5.4. 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.
- 10.6. If the customer will not agree to the risk assessment as described in Section 10.5. 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 4.3 of this Guide).
- 10.7. 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.

- 10.8. Subject to the recommendations of Section 10.3 to 10.5 of this Guide 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:

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.**

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

11. Lead sheathed and rubber insulated cables

- 11.1. 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.

12. Procedure

- 12.1. The procedures described in this Best Practice Guide are summarised in the flowcharts in Annex A.

13. References to other Best Practice Guides

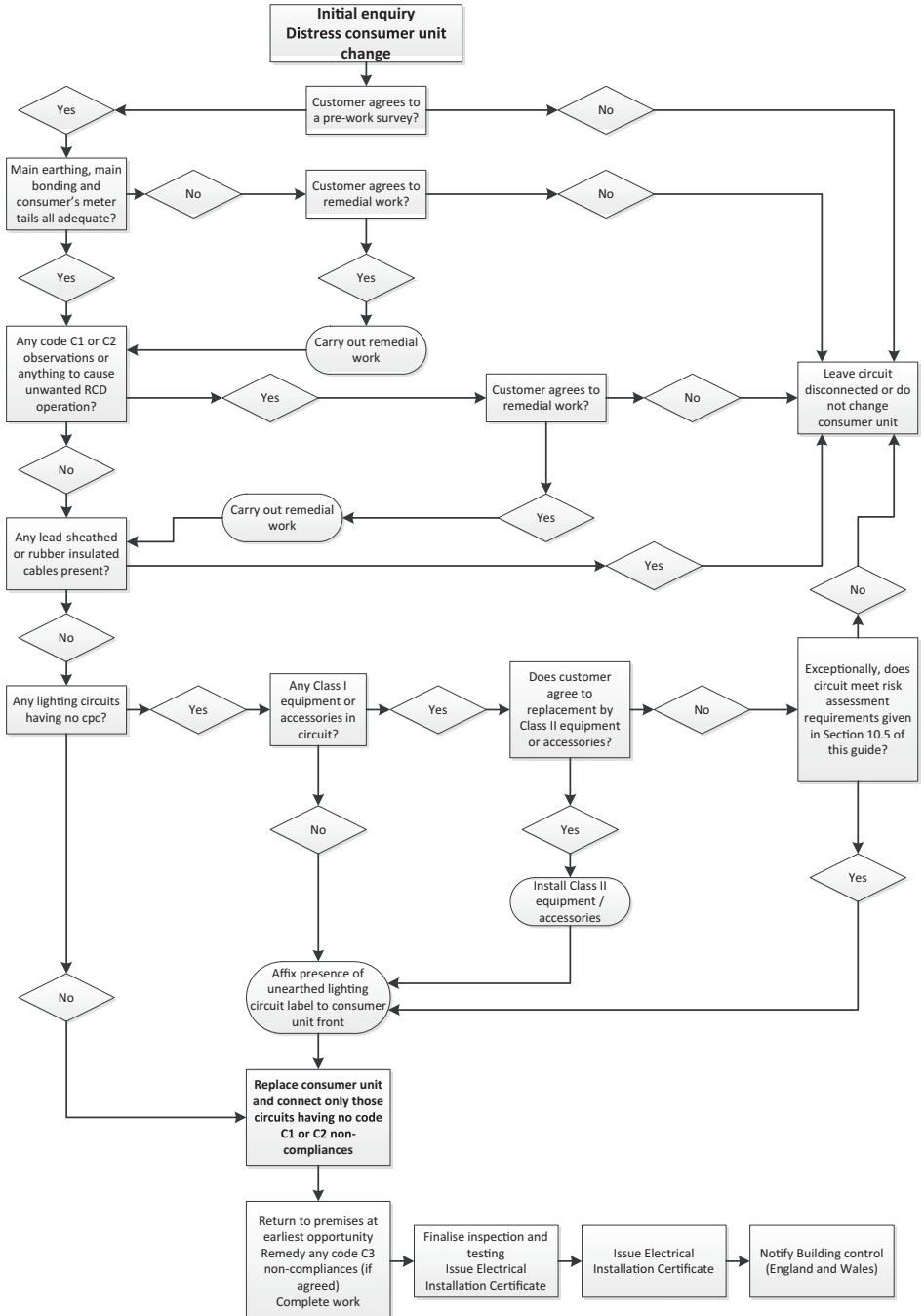
- 13.1. This Best Practice Guide makes reference to the following Best Practice Guides, which may be downloaded from the websites of some of the contributing organisations. The version on the Electrical Safety First website will always be the latest.

www.electricalsafetyfirst.org.uk/electricalprofessionals/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 domestic and similar electrical installations.

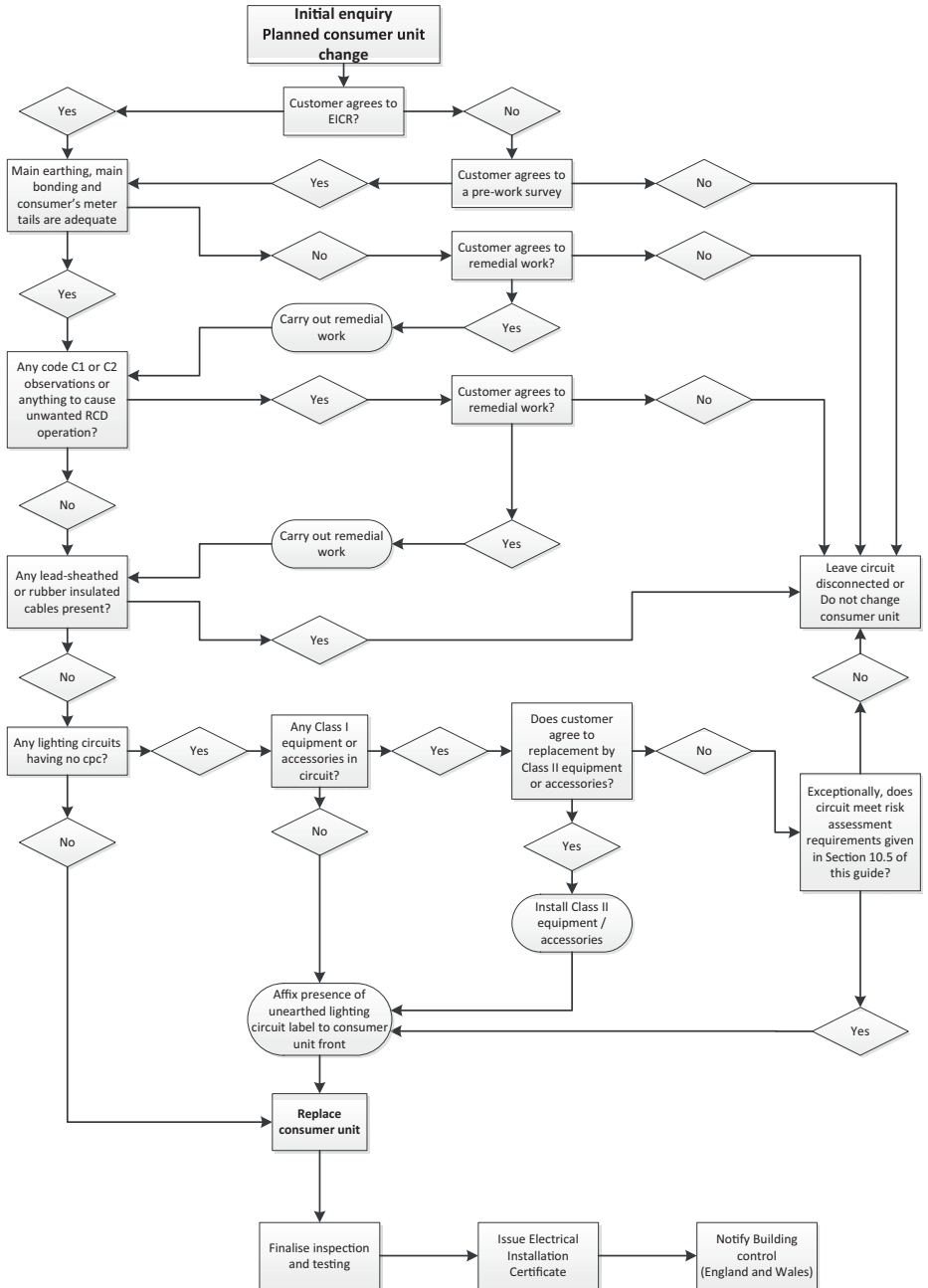
Annex A

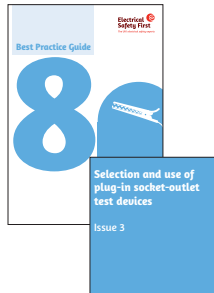
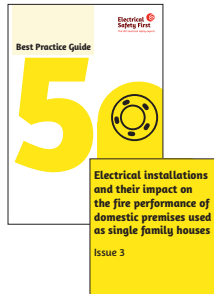
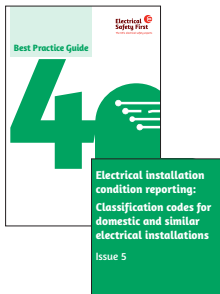
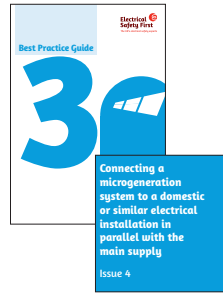
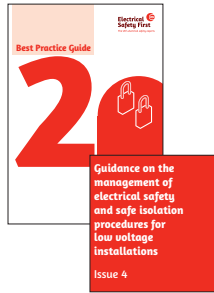
A1 Distress Change



Annex A

A2 Planned Change





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

Email: enquiries@electricalsafetyfirst.org.uk

Web: www.electricalsafetyfirst.org.uk

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