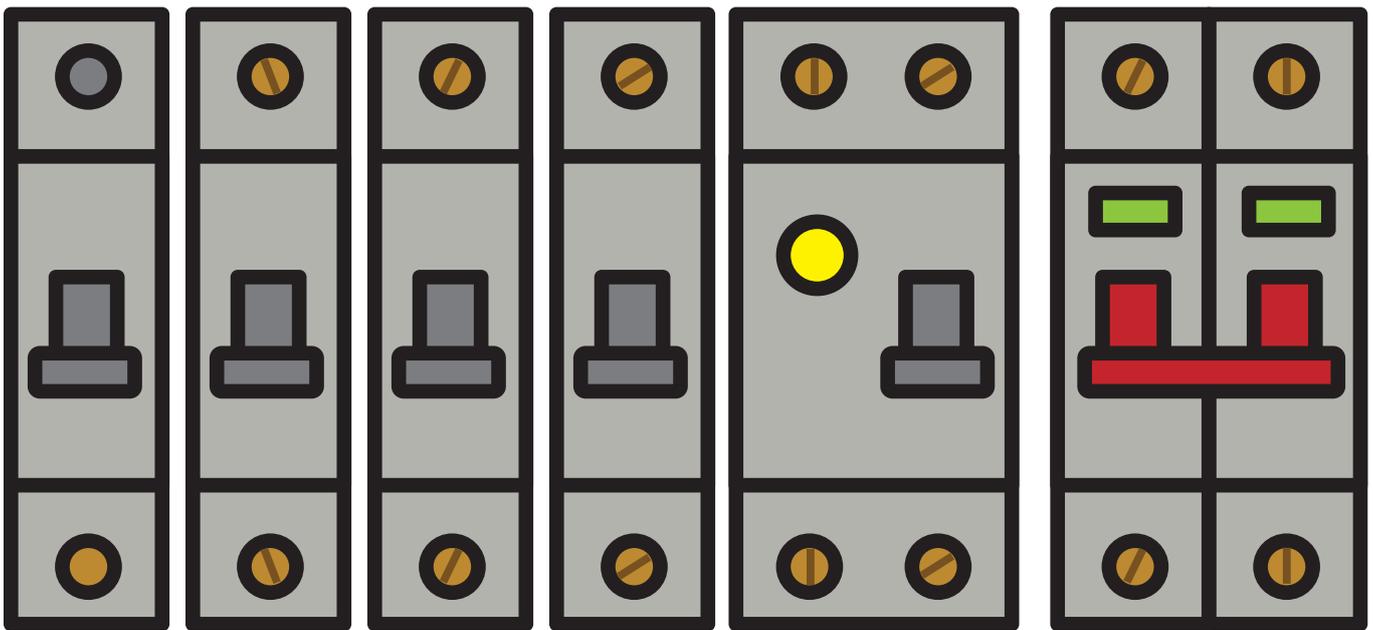
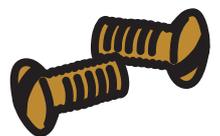


Consumer unit replacement in **domestic and similar premises**



6

 **BestPracticeGuide**
Issue 2



BestPracticeGuide

The Electrical Safety Council is indebted to the following organisations for their contribution and/or support to the development of this Guide, and in particular to NICEIC for providing the initial draft:



BEAMA Installation
www.beamainstallation.org.uk



British Gas
www.britishgas.co.uk



BSI Product Services
www.bsigroup.com



Benchmark Certification Ltd
www.benchmark-cert.co.uk



City & Guilds
www.cityandguilds.com



Electrical Contractors' Association
www.eca.co.uk



ELECSA
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Institution of Engineering and Technology
www.theiet.org



NAPIT
www.napit.org.uk



NICEIC
www.niceic.com



Micropower Council
www.micropower.co.uk



SELECT
(Electrical Contractors' Association of Scotland)
www.select.org.uk



SCEME
www.sceme.org

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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 Council website (www.esc.org.uk) will always be the latest. Feedback on any of the Best Practice Guides is always welcome – email bpg@esc.org.uk

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*The Electrical Safety Council (formerly the National Inspection Council for Electrical Installation Contracting) is a charitable non-profit making organisation set up in 1956 to protect users of electricity against the hazards of unsafe and unsound electrical installations.



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Consumer unit replacement in domestic and similar premises



Photo courtesy of NAPIT

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 a domestic or similar premises wired in accordance with the Seventeenth Edition or earlier versions of the IET Wiring Regulations. The guidance is intended to protect customers 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, 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 necessarily be replaced simply because it has rewirable fuses, cartridge fuses or older-type circuit-breakers, as these devices can provide satisfactory overcurrent protection. Similarly, a consumer unit need not be replaced because it does not incorporate Residual Current Device (RCD) protection, as there may be ways to provide this protection (where required) other than replacing the consumer unit.

2. Introduction

- 2.1. This Guide has been produced by the Electrical Safety Council in association with the bodies indicated on page 2.

3. Limitation

- 3.1. 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.

4. Legal requirements

- 4.1. There is no legal requirement that calls for an existing electrical installation to be upgraded to current standards.
- 4.2. However, there is a requirement under the Building Regulations for England and 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.)
- 4.3. 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.
- 4.4. 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 a 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.
- 4.5. 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, and
 - regulation 14, Work on or near live conductors.
- 4.6. These regulations mean that it will be necessary to make arrangements with the electricity supplier for the cut-out fuse to be withdrawn in order to disconnect the incoming supply for the purpose of isolation, unless a suitable isolating switch has been provided on the supply side of the consumer unit for this purpose. Guidance on safe isolation procedures is given in Best Practice Guide No 2.

5. Requirements of BS 7671

- 5.1. Replacing a consumer unit in an existing installation is an addition or alteration to that installation. The work must therefore be designed, erected and verified in accordance with the requirements of the current edition of BS 7671 (as amended), and must not impair the safety of the existing installation. (Regulations 110.1.2(vi) and 610.4 refer.)
- 5.2. 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.
- 5.3. 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 connected to the consumer unit.
- 5.4. Where a consumer unit is being replaced, additional protection by means of RCDs in accordance with Regulation 415.1 should be provided to the extent required by the current edition of BS 7671 (as amended), such as for:
 - socket-outlets (Regulation 411.3.3 refers),
 - mobile equipment for use outdoors (Regulation 411.3.3 refers),
 - cables concealed in walls or partitions, where required by Regulations 522.6.101 to 522.6.103, and
 - circuits of locations containing a bath or shower (Regulation 701.411.3.3 refers).
- 5.5. 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 refer).
- 5.6. The 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 or addition are also adequate. (Regulation 132.16 refers.)
- 5.7. Any defects found in the reconnected circuits must be recorded on the Electrical Installation Certificate covering the replacement of the consumer unit, as required by Regulation 633.2

6. Main earthing and bonding and meter tails

- 6.1. 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).

Notes.

1. A measurement of the external earth fault loop impedance, Z_e , should be carried out at this stage if practicable.

2. A 6 mm² 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. 16mm² meter tails with a 100A 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 bonding conductors and meter tails that exceed the requirements of BS 7671.

- 6.2. If any of conditions 6.1 (a), (b) or (c) is 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.**

7. Reason for change

- 7.1. The replacement of a consumer unit could be a planned change, as referred to in Section 7.2, or a distress change, as referred to in Section 7.3.

7.2. Planned change

7.2.1. The initial approach of the contractor planning the replacement of a 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.

7.2.2. If the customer refuses, a pre-work survey should be carried out to ascertain if there are any immediate or potential dangers, or 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, 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.

7.2.3. If any immediate danger, potential danger or condition that would cause 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 according to Best Practice Guide Number 4 in an Electrical Installation Condition Report. Potential danger corresponds to one or more observations that would warrant a code C2 classification.

7.2.4. 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.

7.2.5. If the customer is unable, or not prepared, to accept either the cost or the disruption 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 8 before agreeing to replace only the consumer unit.

7.2.6. Where cables are lead or rubber sheathed then deterioration of the cables is likely to necessitate rewiring.

7.3. Distress change

7.3.1. 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) and c) referred to in Section 6.1 must be met.

7.3.2. 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 remedial action is carried out, and



Result of a DIY home owner having wired an 10.5 kW electric shower circuit with 2.5 mm² cable and a 45 A circuit-breaker. (Photo courtesy of British Gas)

8. Risk assessment

8.1. As stated in Section 7.2.5, where it is proposed to replace a consumer unit but the customer is unable or unwilling to accept either the cost or disruption of the 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.

8.2. **In all cases, the initial approach should be to persuade 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.**

8.3. The risk assessment requires inspection and testing (except to the extent these have already been carried out as part of the Electrical Installation Condition Report or pre-work survey mentioned in Section 7.2)

- 8.4. The inspection and testing are 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 according to Best Practice Guide Number 4 in an Electrical Installation Condition Report),
 - b) any potential dangers (observations that would warrant a code C2 classification according to Best Practice Guide Number 4 in an Electrical Installation Condition Report), or
 - c) any lighting circuits that do not have a circuit protective conductor (cpc).

9. Action following risk assessment

- 9.1. If any immediately dangerous conditions are indicated (see paragraph 8.4(a)), the consumer unit should not be replaced unless the departures are corrected or the defective circuits are left disconnected from the replacement consumer unit.
- 9.2. If the risk assessment indicates that there are no immediately dangerous conditions (see paragraph 8.4(a)), the replacement of the consumer unit may proceed.
- 9.3. Any potential danger identified (see paragraph 8.4(b)) should be explained to the customer, and written confirmation given. A strong written recommendation should be made to the customer that remedial action is taken to correct any potentially dangerous conditions without delay.
- 9.4. If there are any lighting circuits that do not have a cpc (paragraph 8.4(c) refers), the recommendations of Best Practice Guide Number 1 (see 12.1) should be followed, as well as those of this guide. In some cases this may mean that the consumer unit should not be replaced unless certain works, recommended in Best Practice Guide Number 1, are carried out. Alternatively the circuits should not be connected to the replacement consumer unit.

10. Inspection, testing and certification

- 10.1. The alteration or addition itself (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 610 of BS 7671 (as amended) and an Electrical Installation Certificate in accordance with BS 7671, detailing the work, should be given by the installer to the customer.
- 10.2. In addition, as a minimum, the following tests should be carried out to the existing circuits connected to the replacement consumer unit.
 - A continuity test 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 continuity test of all ring final circuit conductors.
 - 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 test of the polarity and a test to establish the earth 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 10.1 of this Guide.

- 10.3. The Electrical Installation Certificate should identify in the comments section any potential dangers that exist with the reconnected circuits (code C2 items, see paragraph 8.4(b)) and other defects that exist in the reconnected circuits, and that the installation of the consumer unit has been carried out in accordance with the recommendations in this guide.
- 10.4. 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 this should be done.

11. Procedure

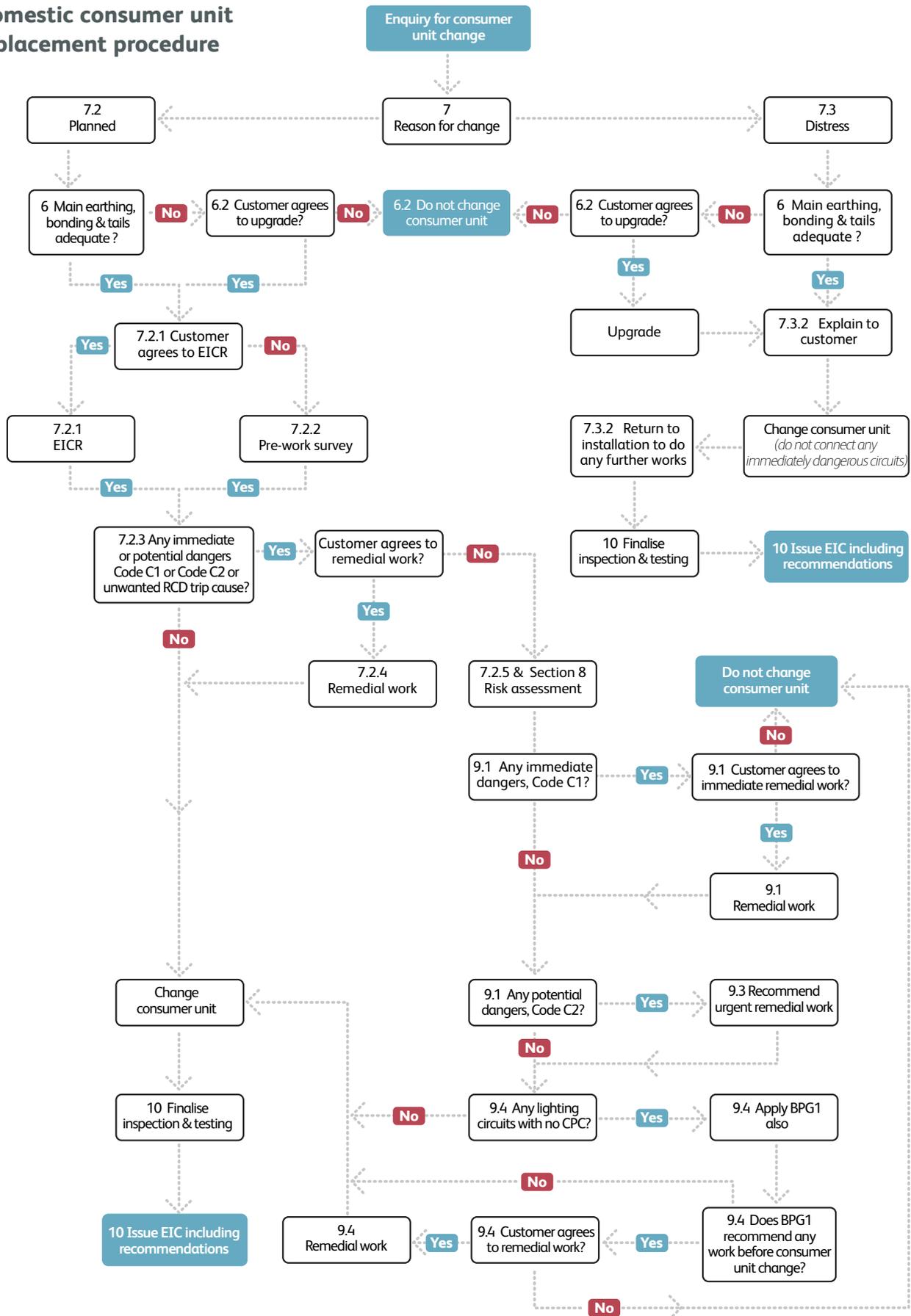
11.1. The procedure described in this Best Practice Guide is summarised in the flowchart on page 9.

12. References to other Best Practice Guides

12.1. 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 ESC website (www.esc.org.uk) will always be the latest.

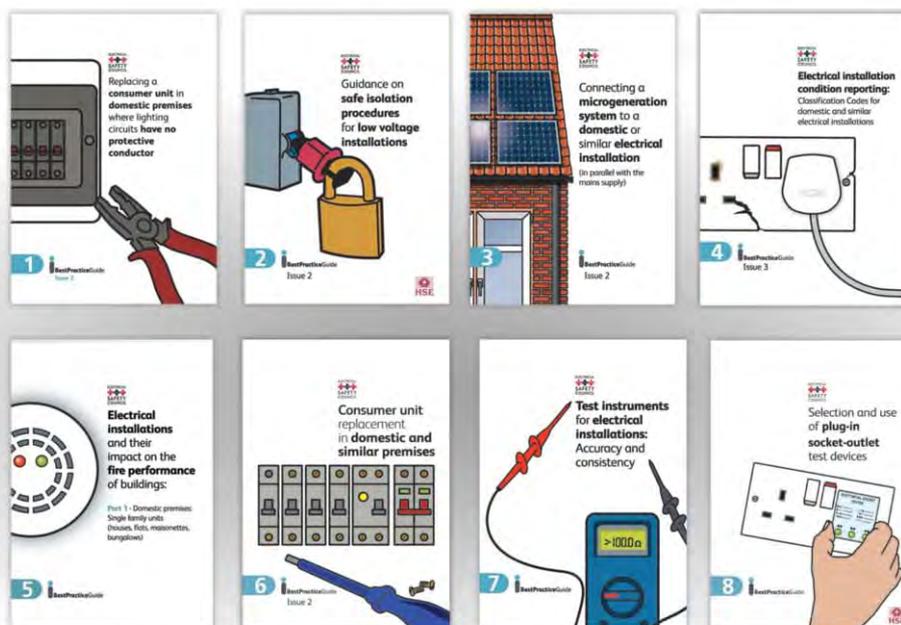
- **Best Practice Guide No 1** – Replacing a consumer unit in domestic premises where lighting circuits have no protective conductor.
- **Best Practice Guide No 2** – Guidance on management of electrical safety and safe isolation procedures for low voltage installations.
- **Best Practice Guide No 4** – Electrical installation condition reporting: Classification Codes for domestic and similar electrical installations.

Domestic consumer unit replacement procedure

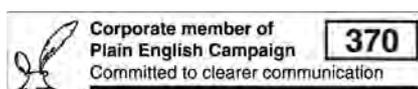


Note: The numbers in the boxes of this flowchart refer to the numbers of the sections in this guide

Your Notes



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