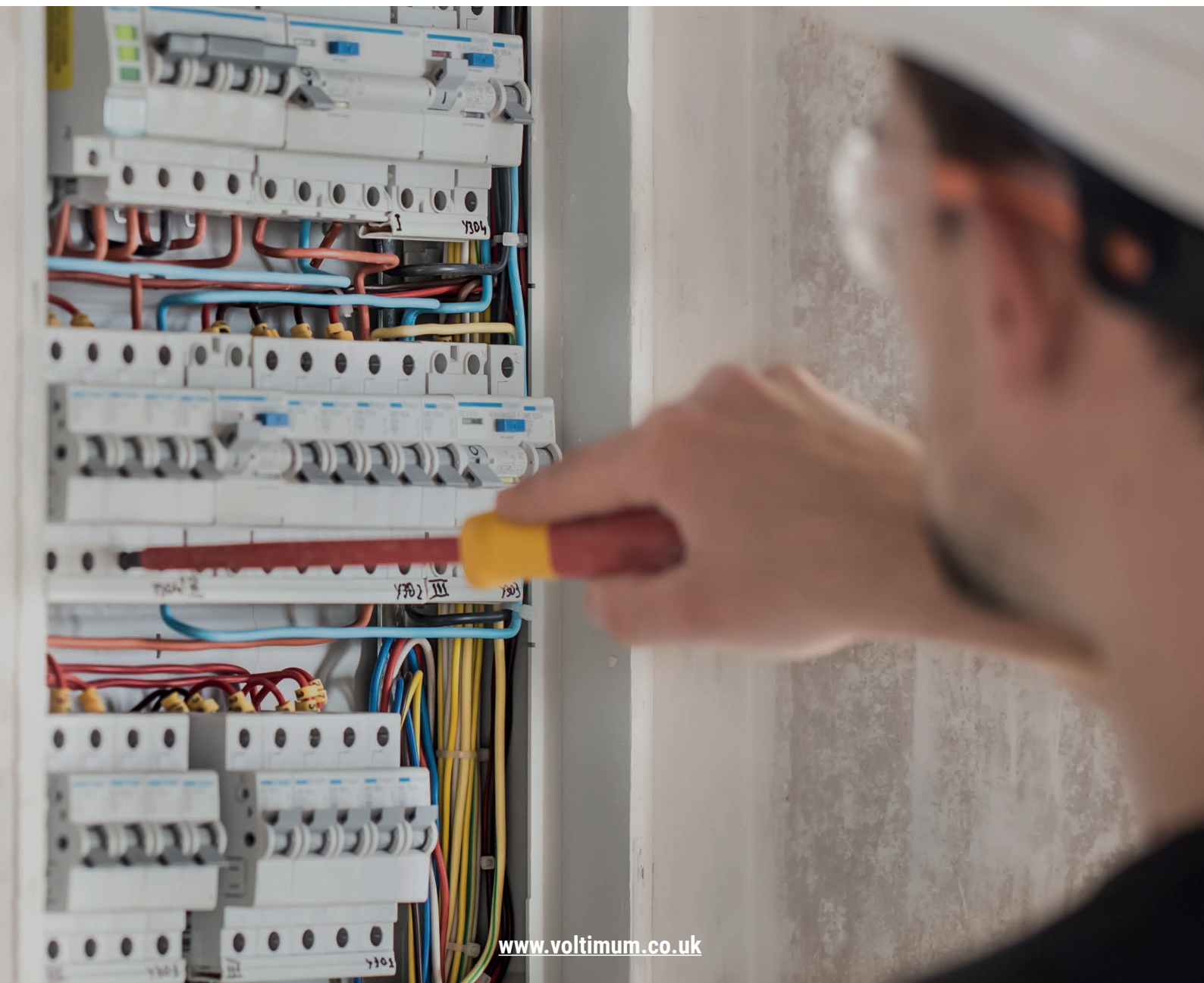


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BS 7671 AMENDMENT 2



BS 7671 undergoes periodic changes as new IEC/CENELEC documents are absorbed into the UK Wiring Regulations. It is a requirement that the UK takes on board the ‘technical intent’ of any new IEC/CENELEC Standards and to that end JPEL64 works to amend or add to the existing Standard (BS 7671).

This article will briefly highlight many of changes that have been introduced into Amendment 2 of BS 7671: 2018.

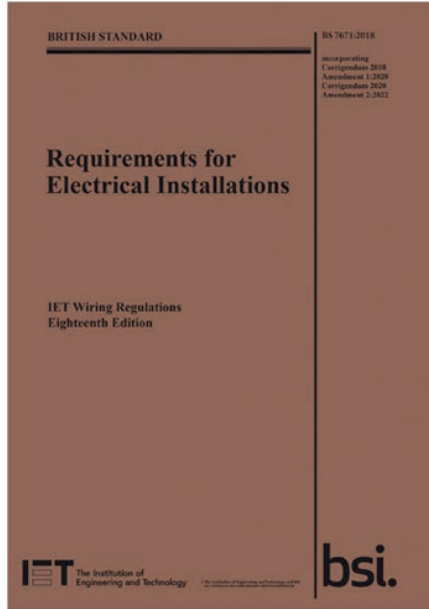


Figure 1 - New version of BS 7671 Amd 2

As with previous versions of BS 7671, changes to the Standard are highlighted by side bars throughout the document.

NOTES ON THE PLAN OF THE 18TH EDITION

Many users of BS 7671 may not necessarily be familiar with the context of language and terms used within the Standard. These terms may have been recognised by those intimately familiar with the Standard, but less so by those who simply reference the various requirements. Amendment 2 helpfully provides guidance on the use of language and the new table lists what is meant by terms such as ‘Requirement’, ‘Regulation’, ‘Permission’ and the like. The table detailed in BS 7671 is based on a BSI publication, ‘Rules for structure and drafting of UK standards’.

Verbal forms used in BS 7671		
Implication	Verbal form	Typical context
Requirement	Shall	Normative
Recommendation	Should	Informative
Permission	May	Informative

Table 1 - Part detail of table listed in BS 7671

PART 1 – FUNDAMENTAL PRINCIPLES

There are minor changes to Part 1 detailing the additional requirements in Regulation 110.1.2 for prosuming low voltage installations (Prosumers Electrical Installation - PEI) detailed in the new Part 8 (120.3) of the standard and for the support of fibre optic cables.

PART 2 - DEFINITIONS

There have been several new and altered definitions within Part 2, including a definition of Arc Fault Detection Devices (AFDDs). Many of these have been introduced because of the new Part 8 (prosuming installations).

PART 4 – PROTECTION FOR SAFETY

PROTECTION AGAINST ELECTRIC SHOCK

There are three major changes made to Chapter 41 including greater clarity over what is a protective equipotential bonding conductor (411.3.1.2).

- Protective equipotential bonding

Regulation 411.3.1.2 makes it clearer that extraneous-conductive-parts are metallic; and the associated note makes it even clearer that where a non-metallic pipe (plastic) enters an installation and then is connected to metallic pipes, it is unlikely that such metalwork becomes an extraneous-conductive-part, and thus does not require bonding.

Regulation 411.3.1.2 also makes it clear that where telecommunication cables enter an installation and require bonding then:

- the consent of the owner or operator of the cable shall be sought, and
- where consent is not given that a record is made on the Electrical Installation Certificate or Minor Electrical Installation Works Certificate as appropriate.
- RCDs

Regulation 411.3.3 has been updated to limit the use of risk assessments when installing socket-outlets having a current rating not exceeding 32 A. Indent (ii) of the regulation does permit a risk assessment to be applied where a skilled (electrically) person determines the RCD protection is not necessary. However, where this is the case, a documented risk assessment must be suitably attached with the EIC.

- Earth electrode

For TN systems Regulation 411.4.2 has added a new **recommendation** that an earth electrode meeting the requirements of Chapter 54 is installed and connected to the main earthing terminal (MET).

CHAPTER 42 - PROTECTION AGAINST THERMAL EFFECTS

Chapter 42 has undergone several important changes.

- AFDDs



Figure 2 - AFDD

The most immediate change is the mandating of AFDDs in final circuits supplying socket-outlets having a current rating not exceeding 32 A in certain specific locations (421.1.7). The named locations include:

- Higher Risk Residential Buildings (HRRB)
- Houses in Multiple Occupation
- Purpose-built student accommodation
- Care homes.

Note 1 of Regulation 421.1.7 describes an HRRB as:

A residential building over 18 m in height or in excess of six storeys, whichever is met first.

Furthermore, AFDDs are recommended for use in all other locations supplying socket-outlets having a rated current not exceeding 32 A.

- Where a particular risk of fire exists

Section 422 has undergone significant changes in Amendment 2.

The reference to 'BD' evacuation codes (Appendix 5) and included in Section 422 have been removed. Regulation 422.1 has been rewritten to encourage the designer of the electrical installation to consider the fire safety design of the installation, and to share with the person responsible for the building the basis of the design including any routine maintenance requirements. It is likely that the designer will need to collaborate with other building professionals to design suitable systems where a particular risk of fire exists.

A new definition has been added to Part 2 covering Protected Escape Routes:

'A route enclosed with specified fire-resisting construction designated for escape to a place of safety in the event of an emergency.'

It is likely that the designer will need to reference other relevant standards such as BS 9999: 2017 when considering the nature of protected escape routes (Fig 3).

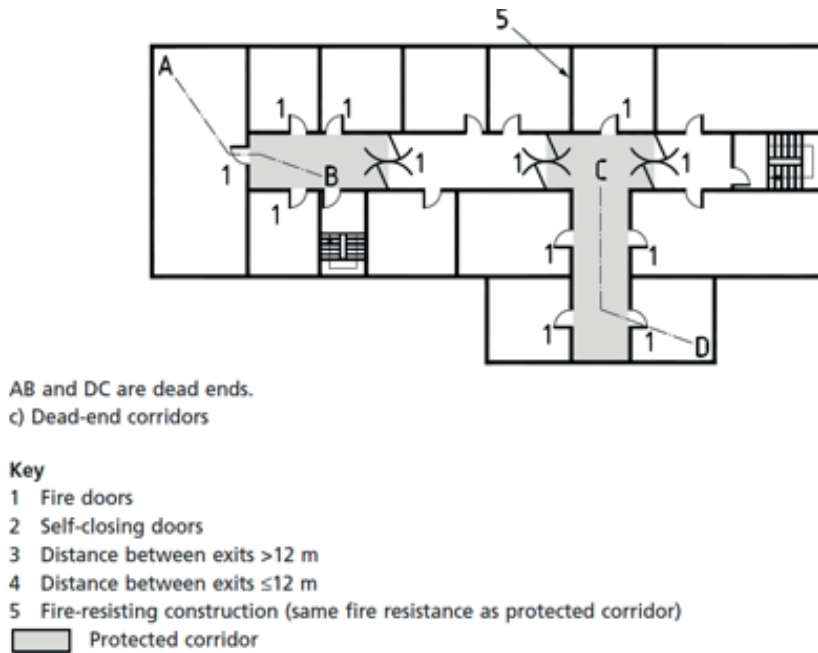


Figure 3

Regulation 422.2 has been wholly rewritten to detail what is required in protected escape routes. To this end, cables and/or other electrical equipment shall not be installed within protected escape routes (as defined) unless they are:

- An essential fire safety or related safety system, such as fire detection and alarm systems or emergency lighting systems,
- General needs lighting, and
- Socket-outlets provided for cleaning or maintenance.

The impact of this is that the only cables to be installed within protected escape routes are for the purposes detailed above. Furthermore, Regulation 422.2.1 provides the minimum requirements for cables within protected escape routes.

To help the designer, the new Appendix 13 provides helpful guidance on escape routes and fire protection.

Critical to a protected escape route is the ability to maintain a fire sterile environment and limit the amount of smoke to enable people to safely leave a building. To this end Regulation 422.2.1 details the cable requirements and relevant cable management systems. Much of this is similar to the previous version of Regulation 422.2.1 but has been made clearer to separate out the implications for cable management systems.

In locations where the risk of fire is due to the nature of stored or processed material Regulation 422.3.4 has been rewritten to make clear that any cables installed must meet the requirements of *BS EN 60332-1-2* unless they are fully embedded within non-combustible material, such as plaster or concrete, or installed within a suitable conduit or trunking / ducting system satisfying the test conditions of *BS EN 61386-1* for conduit or *BS EN 50085* series for trunking/ducting.

Where it is proposed to use non-metallic cable management systems in such locations, Note 3 suggests that the manufacturer is consulted to confirm the suitability for use of cables not conforming to the *BS EN 60332-3* series.

CHAPTER 44 – PROTECTION AGAINST VOLTAGE DISTURBANCES AND ELECTROMAGNETIC DISTURBANCES

Other than Regulation Group 443.4 there have been only a few amendments to language and cross-referencing. However, Regulation 443.4 has been split into two new regulations, 443.4.1 and 443.4.2.



Figure 4 - SPD

Regulation 443.4.1 covers the first part of the old Regulation 443.4, and now limits the requirement for SPDs to three specific conditions. These are, where overvoltage could result in:

- serious injury to, or loss of, human life,
- failure of a safety service (as defined in Part 2), and
- significant financial or data loss.

The emphasis on those areas not included in the above list is also now for SPDs to be installed unless the owner of the installation declares they are not required, and they accept the risk of loss or damage to equipment.

Regulation 443.4.2 covers the final paragraph of the old Regulation 443.4 and deals with the situation where it is likely that equipment producing switching overvoltages or disturbances likely to exceed the rated impulse voltages detailed in Table 443.2. Such switching is likely to occur when switching inductive loads such as motors and the like.

The calculated risk level (CRL) assessment method detailed in Regulation 443.5 has now been deleted and is no longer applicable.

PART 5 SELECTION AND ERECTION OF EQUIPMENT

There have been several changes to Part 5, although these are limited to a few specific chapters.

CHAPTER 51 – COMMON RULES

Two Notes have been added to Regulation 511.1 to help those concerned with the acceptance of foreign standards. It is worth noting that Note 2 does not recommend any foreign standards not based on an IEC Standard to be used.

The new Note attached to Regulation 511.2 (equipment not covered by a British or Harmonised Standard or used outside of its scope) expects any assessment of compliance with BS 7671 to cover the same criteria detailed in Note 1 of Regulation 511.1.

SECTION 512 – OPERATIONAL CONDITIONS AND EXTERNAL INFLUENCES

- Compatibility

The compatibility requirement is concerned with selecting and erecting equipment that will not cause harmful effects to other equipment. Regulation 512.1.5 has been amended to make it clear that the 70 °C limit associated with switchgear is met when live conductors are chosen based on the current rating of 70 °C irrespective of their maximum permitted temperature rating.

Reference is also made to Regulations 526.2 (electrical connections), 523.1 (current-carrying capacity of cables), 536.4.202 (current ratings) and Table 4A3.

The reference to electromagnetic compatibility has been amended to reference the Electromagnetic Compatibility Regulations 2016 (EMC). Note 2 of Regulation 512.1.5 reminds the installer that they are the responsible person insofar as the EMC Regulations are concerned.

SECTION 514 – IDENTIFICATION AND NOTICES

- Identification of conductors

Table 51 has been updated to include the differentiation between protective conductors (PE), protective bonding conductors (PB) and functional earthing conductors (FE), and the coding of colours, for example BN (Brown) and BU (Blue).

- Diagrams and documentation

As domestic and similar premises are typically 'simpler' than other electrical installations, a suitable certificate including the updated text for recipient guidance is considered sufficient information for the person ordering the work (Regulation 514.9.1).

A new regulation, 514.9.2, requires that diagrams, charts, information, instruction notices and all warning notices shall comply with a range of relevant Standards detailed in the regulation.

- Notices: periodic inspection and testing

There have been minor 'tweaks' to the notices detailed in Regulations 514.12.1 and 514.12.2. Reference has been made to a new Appendix 11 (Warning and User Instruction Labels). Usefully, Appendix 11 gives guidance on the font, font size and the relevant standards to be applied when issuing labels and notices.

Table 11A gives the minimum label text and symbol sizes

- Notices: mixed wiring colours

Regulation 514.14.1 has been deleted in addition to the removal of Appendix 7. There is no longer any requirement for the warning notice about wiring colours to be used.

- Notices: presence of SPDs

Although not necessary for domestic premises, the increased use of SPDs is recognised in Amendment 2 with a notice required at each relevant distribution board (514.16.1).

- Notices: high protective conductor current

Regulation 514.17.1 now calls for a warning notice to be provided where required by Regulation 543.7.1.205.

CHAPTER 52 – SELECTION AND ERECTION OF WIRING SYSTEMS

There have been few changes to Section 522 and 523, although it is worth noting that the old Table 52.2 which detailed the derating factors for cables buried within thermal insulation has moved to Item 2.6 of Appendix 4.

Within Section 524, Table 52.3 has been modified to permit power circuits to have a minimum cross-sectional area of 1.0 mm² rather than 1.5 mm².

Section 527 has a new note attached to Regulation 527.2.2 referencing manufacturers' guidance on specific fire sealing products.

CHAPTER 53 – PROTECTION, ISOLATION, SWITCHING, CONTROL AND MONITORING

There have been few changes in Chapter 53, however it is important not to miss the amendments relating to Type AC RCDs (531.3.2). In addition, socket-outlets and fused connections units to *BS 7288* having an integral RCD have been reintroduced.

CHAPTER 54 – EARTHING ARRANGEMENTS AND PROTECTIVE CONDUCTORS

There have been few changes to Chapter 54, however, there have been modifications to Regulation Group 543.7 recognising the precautions for high protective conductor currents in excess of 10 mA.

Regulation 544.1.1 has clarified some of the issues relating to the sizing of the protective bonding conductor where an installation serves more than one building.

CHAPTER 64 – INITIAL VERIFICATION

There have been important changes to Regulation Group 643.3 relating to insulation resistance testing. Regulation 643.3.3 recognises that the installation should be tested prior to sensitive electrical equipment being connected, and that subsequent testing may be limited to 250 V DC between live conductors and the protective conductor.

The testing of RCDs has also been amended, and the notes within Regulation 643.7.1 should be referenced.

SECTION 704 – CONSTRUCTION AND DEMOLITION SITES

Regulation 704.522.8.101 highlights specific requirements for the protection of cables against mechanical stresses.

Regulation 704.537.2 amends the requirements for devices for isolation.

SECTION 706 – CONDUCTING LOCATIONS WITH RESTRICTED MOVEMENT

Protection against electric shock has been changed and Regulation 706.410.3.3 provides requirements for the supply to mobile equipment.

The additional requirements for the protective measure extra-low voltage provided by SELV or PELV has been amended in Regulation Group 706.414.3. Additional protection by supplementary equipotential bonding has also been amended in Regulation 706.415.2.1.

SECTION 710 – MEDICAL LOCATIONS

There have been several changes to Section 710. One such change is Regulation 710.415.2.3 which requires an equipotential bonding busbar (EBB) to be located in or near each medical location it serves. The EBB should be readily accessible with consideration given to local infection prevention and control requirements. To this end, the EBB must not be located within a ceiling void.

Furthermore, the general requirement for AFDDs does not apply to medical locations of Group 1 or 2. In Group 0 locations AFDDs may be installed where subject to a risk assessment (710.421.1.7).

Type AC RCDs are not permitted for use in either Group 1 or Group 2 medical locations (710.531.3).

Socket-outlets in Group 2 locations are to be, unswitched, coloured blue, and clearly and permanently marked "Medical Equipment Only" (710.553.1).

Regulation 710.559 regarding luminaires and lighting installations has been amended.

SECTION 711 – EXHIBITIONS, SHOWS AND STANDS

Section 711.41 has been amended and limits the use of certain protective measures, such as non-conducting locations and lists the permitted protective measures, such as ADS with additional protection by means of an RCD having ($I_{\Delta n} \leq 30$ "mA").

Section 711.53 (Protection, isolation, switching, control and monitoring) has been amended to require selectivity between RCDs.

Regulation 711.55.101 (ELV transformers and electronic converters) has been updated. Furthermore, Section 711.559 has been rewritten.

SECTION 712 – SOLAR PHOTOVOLTAIC (PV) POWER SUPPLY SYSTEMS

Section 712 has been wholly amended and a subsequent article will give more detail.

SECTION 714 – OUTDOOR LIGHTING INSTALLATIONS

714.411.3.4 is a new regulation that details additional protection requirements by an RCD (30 mA) for publicly accessible lighting in certain locations.

SECTION 717 – MOBILE OR TRANSPORTABLE UNITS

Regulation 717.411.4 has been amended to permit a PME earthing facility to be used where the unit is located within, or outdoors on an upper storey or roof of, a building or structure containing the electrical installation which supplies the unit.

SECTION 721 – ELECTRICAL INSTALLATIONS IN CARAVANS AND MOTOR CARAVANS

Regulation 721.521.2 has been amended to include many more forms of conduit (systems) and trunking (systems).

SECTION 722 – ELECTRICAL VEHICLE CHARGING INSTALLATIONS

There are several changes that have been included in Section 722. Indent (i) of Regulation 722.411.4.1 has been deleted and Note 1 has been changed. There are also broader opportunities for designer/specifiers to use equipment not covered by either a British or Harmonized Standard.

A new regulation, 722.826.3.201 has been added to address the new Chapter 82.

The informative annex A722 has been updated and includes guidance on voltage monitoring devices.

SECTION 753 – HEATING CABLES AND EMBEDDED HEATING SYSTEMS

Regulation Group 753.554.4 has been moved from Regulation Group 554.4. No other significant changes have been made.

PART 8 – FUNCTIONAL REQUIREMENTS

CHAPTER 82 – PROSUMER'S LOW VOLTAGE ELECTRICAL INSTALLATIONS

Chapter 82 is a completely new chapter within *BS 7671*. The chapter provides additional requirements, measures and recommendations for the design, erection and verification of all types of low voltage electrical installation as they integrate the production and use of electrical energy. The elements included are, PV generators, battery storage, EV charging as well as the normal supply.

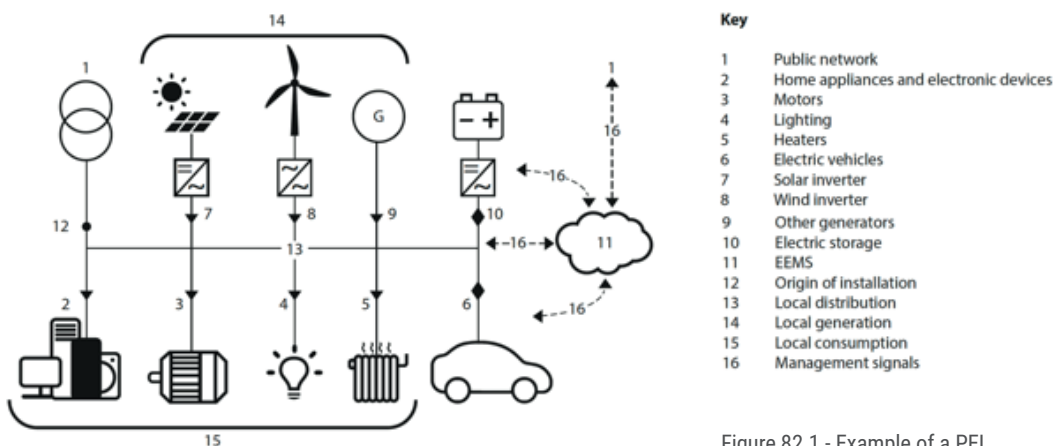


Figure 82.1 - Example of a PEI

Fig. 82.1 from Chapter 82 gives an example of a prosumer's electrical installation. This chapter will be considered in more detail in subsequent articles.

APPENDICES

There have been minor changes to Appendix 1, 2, 3 and 4.

Appendix 6 (Model forms for certification and reporting) has been amended to align with the changes made within *BS 7671*.

Appendix 7 (Harmonised cable core colours) has been deleted.

Appendix 11 (Warning and user instruction labels) is a new appendix and covers the font, size and nature of text to be used for labels.

Appendix 13 (Escape routes and fire protection) replaces the old 'Measures for measuring the insulation resistance/impedance of floors and walls to earth or to the protective conductor systems'.

The new appendix gives guidance on cables in protected escape routes and the fire sealing of building elements.

Appendix 17 (Energy efficiency) has been amended to add more guidance for the designer. It is possible that a future amendment to *BS 7671* may incorporate energy efficiency in a new Chapter 81.

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