



THE IMPACT OF THE 17TH EDITION OF THE WIRING REGULATIONS

by Geoff Cronshaw

IN THIS second article we look at more of the changes expected in the 17th Edition of the *IEE Wiring Regulations* and the impact these will have on the design, erection and verification of electrical installations. This article is generally based on the Draft for Public Comment and therefore the actual requirements may change.

Chapter 55 – other equipment. Regulation 551 – Low voltage generating sets

This set of Regulations now includes additional requirements contained in Regulation 551.2 to ensure the safe

connection of low-voltage generating sets including small scale embedded generators.

A new Regulation 551.4.2, regarding the use of RCDs, has been added. Regulation 551.4.2 states: the generating set shall be connected so that any provision within the installation for protection by RCDs in accordance with Chapter 41 remains effective for every intended combination of sources of supply. Notes have been added including one to Regulation 551.1 stating that the procedure for connecting generating sets up to 16A in parallel with the

public supply is given in ESQCR 2002. For sets above 16A the requirements of the distributor must be ascertained.

The 17th Edition recognises that there are two connection options:

- (i) connection into a separate dedicated circuit.
- (ii) connection into an existing final circuit.

Connection into a dedicated circuit is preferred. Regulation 551.7.2 sets out the requirements for the two options.

The Regulation requires that a generating set used as an additional source of supply in parallel with another source shall either be installed on the supply side of all protective devices for the final circuits of the installation (connection into a separate dedicated circuit) or if connected on the load side of all protective devices for the final circuits must fulfil a number of additional requirements.

These additional requirements are:

- (i) the current carrying capacity of the final circuit conductors shall be greater than or equal to the rated current of the protective device plus the rated output of the generating set and
- (ii) A generating set shall not be connected to a final circuit by a plug and socket and
- (iii) A residual current device providing additional protection of the final circuit in accordance with Regulation 415.1 shall disconnect all live conductors including the neutral conductor and
- (iv) The line and neutral conductors of the final circuit and of the generating set shall not be connected to earth and
- (v) Unless the device providing automatic disconnection of the final circuit in accordance with Regulation 411.3.2 disconnects the line and neutral conductors, it shall be verified that the combination of the disconnection time of the protective device for ►

◀ the final circuit and the time taken for the output voltage of the generating set to reduce to 50V or less is not greater than the disconnection time required by Regulation 411.3.2 for a final circuit.

Section 559 luminaries and lighting installations

Section 559 luminaries and lighting installations is a new series of Regulations giving particular requirements for fixed outdoor lighting installations, extra-low voltage lighting installations, and lighting for display stands.

Section 559 includes requirements from Regulations 553-03 (lampholders) and 553-04 (lighting points) in the 16th Edition. This new section also includes requirements from Section 611 (Highway Power Supplies and Street Furniture) of the 16th Edition.

The impact of this new section is that additional requirements are now included in the Regulations for general lighting including requirements for protection against fire, connection of luminaires to the fixed wiring, fixing of the luminaires, requirements for through wiring in a luminaire, requirements for control gear eg ballasts, and compensation capacitors. A further new requirement is the need to give consideration to stroboscopic effects.

The Regulations for outdoor lighting installations has been expanded compared to Section 611 in the 16th Edition, to cover, car parks, gardens, parks, places open to the public, illumination of monuments and floodlighting. Other lighting arrangements specifically mentioned include telephone kiosks, bus shelters, advertising panels and town plans, which it is recommended are provided with additional protection by a 30mA RCD.

Regulation group 559.11 is a completely new series of Regulations that were not included in the 16th edition covering requirements for extra-low voltage lighting installations. The particular requirements of these Regulations apply to extra-low voltage lighting installations supplied from sources with a maximum rated voltage of 50 V ac rms or 120 V dc

The Regulations include requirements for protection against electric shock (SELV), protection against the risk of fire due to short circuit, types of wiring systems including special requirements where bare conductors are used, the types of transformers and converters, and requirements for suspended systems.

New sections on special locations

The 17th Edition includes additional sections on special locations not

currently included in the 16th Edition as follows:

- Marinas
- Photovoltaic power systems
- Exhibitions, shows and stands
- Floor and ceiling heating systems
- Mobile and transportable units
- Fairgrounds, amusement parks and circuses

Marinas: There are particular risks associated with electrical installations in marinas. The environment of a marina or yachting harbour is harsh for electrical equipment. The water, salt and movement of structures accelerate deterioration of the installation. The presence of salt water, dissimilar metals and a potential for leakage currents increases the rate of corrosion. There are also increased electric shock risks associated with a wet environment, by reduction in body resistance and contact with earth potential. Site investigations should be carried out at an early stage to determine likely maximum wave heights. This is of particular importance in exposed coastal sites. Where marinas have breakwater type pontoons, it is likely that under certain conditions waves will pass over the structure.

The risks specifically associated with craft supplied from marinas include:

- i) Open circuit faults of the PEN ►



Wiring Matters is produced by IET Services Limited, a subsidiary of The Institution of Engineering and Technology (IET), for the IET. Michael Faraday House, Six Hills Way, Stevenage, Herts, SG1 2AY, United Kingdom Tel: +44 (0)1438 313311 Fax: +44 (0)1438 313465

Advertising Sales D Smith +44 (0)1438 767224 daniellesmith@theiet.org | **Editor** G D Gronshaw +44 (0)1438 767384 gronshaw@theiet.org | **Contributing Editors** M Coles, J Elliott, J Ware | **Design** Sable Media Solutions

IEE Wiring Matters is a quarterly publication from the Institution of Engineering and Technology (IET). The IET is not as a body responsible for the opinions expressed.

©2007: The Institution of Engineering and Technology. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means without the permission in writing of the publisher. Copying of articles is not permitted except for personal and internal use. Multiple copying of the content of this publication without permission is always illegal. Web-offset printing by Wyndeham Heron, The Bentall Complex, Colchester Road, Heybridge, Maldon, Essex, UK

Co-operating Organisations The Institution of Engineering & Technology acknowledges the contribution made by the following organisations in the preparation of this publication: British Electrotechnical & Allied Manufacturers Association Ltd – R Lewington, P D Galbraith, M H Mullins | Department for Communities and Local Government – I Drummond | Electrical Contractors Association – D Locke, S Burchell | City & Guilds of London Institute – H R Lovegrove | Energy Networks Association – D J Start | Electrical Contractors Association of Scotland SELECT – D Millar, N McGuinness | Health & Safety Executive – K Morton | Electrical Safety Council | ERA Technology Limited – M Coates | British Cables Association – C Reed | Scottish Building Standards Agency | DTI – D Tee | CORGI – P Collins | GAMBICA – K Morris.

ISSN 1749-978-X

◀ conductor of PME supplies raising the potential to true earth of all metalwork (including that of the craft, if connected) to dangerous levels

- ii) Inability to establish an equipotential zone external to the craft
- iii) Possible loss of earthing due to long supply cable runs, connecting devices exposed to weather and flexible cord connections liable to mechanical damage.

Particular requirements to reduce the above risks include:

- i) Prohibition of a TN-C-S system for the supply to a boat. (Regulation 709.411.4)
- ii) Additional protection by 30 mA RCDs in both the craft and the marina installation. (Regulation 709.531.2)
- iii) outlets to be installed at not less than 1m above the highest water level. (Regulation 709.553.1.13 does give certain exceptions.)

There are also additional requirements to meet the conditions of external influences.

PV supply systems

This section applies to the electrical installations of PV power supply systems including systems with ac modules. Stand alone systems are still under consideration.

This section includes the following additional measures:

Regulation 712.410.3 – PV equipment on the dc side shall be considered to be energised, even when the system is disconnected from the ac side.

Regulation 712.410.3.6 – The protective measures of non conducting location and earth free local equipotential bonding are not permitted on the dc side.

Regulation 712.411.3.2.1.1 – On the ac side, the PV supply cable shall be connected to the supply side of the device supplying current using equipment.

Regulation 712.537.2.1.1 – To allow for maintenance, means of isolating the ac and dc sides of the PV convertor shall be provided.

There are also additional requirements for accessibility, external influences, routing of protective conductors, selection and erection of cables to avoid the risk of lightning strike, short-circuit and earth faults, overcurrent protection, compliance with standards, protection against electromagnetic interference and devices for isolation.

For detailed requirements of this section please refer to the specific article concerning PV systems in this edition of *Wiring Matters*.

Exhibitions, shows and stands

The risks associated with exhibitions, shows and stands are those of electric shock and fire. These arise from:

1. the temporary nature of the installation
2. lack of permanent structures
3. severe mechanical stresses
4. access to the general public.

Because of these increased risks additional measures are required.

Regulation 711.410.3.4 – A cable intended to supply temporary structures shall be protected at its origin by an RCD with maximum residual operating current 300mA.

Regulation 711.3.1.2 – Bonding of all metallic structural parts which are accessible within the stand etc.

Regulation 711.3.3 – Additional protection is required for all final circuits and sockets-outlets up to 32A by RCD to 415.1.1.

Regulation 711.411.4 – TN-C-S shall not be used.

Regulation 711.5372.3 – every temporary structure, such as a vehicle, stand or unit, intended to be occupied by one specific user and each distribution circuit supplying outdoor installations shall be provided with its own readily accessible and properly identifiable means of isolation.

Floor and Ceiling Heating Systems

This Section applies to the installation of electric floor and ceiling heating systems; it does not apply to wall heating or outdoor heating systems. The risks associated with ceiling heating systems are generally that of penetration of the heating element by nails, drawing pins, etc pushed through the ceiling surface. For this reason Regulation 753.411.3.2 requires RCDs with a maximum rated residual operating current of 30mA shall be used for automatic disconnection of supply.

Similarly, there are concerns that under-floor heating installations can be damaged by carpet gripper nails, etc and for similar reasons protection by a 30 mA RCD is required. To protect the building structure and provide precautions against fire, there are requirements to avoid overheating of the floor or ceiling heating system.

Heating units manufactured without exposed conductive parts shall be provided on site with a grid with spacing of not more than 30mm, or other suitable conductive covering above the floor heating or below the ceiling heating and connected to the protective conductor of the installation.

Mobile and transportable units

The particular requirements of this Section apply to mobile or transportable units. These may be self-propelled, towed or transportable containers or cabins.

Examples of the units include technical and facilities vehicles for the entertainment industry, medical services, advertising, fire fighting, workshops, offices, transportable catering units etc.

The risks associated with mobile and transportable units include: Risk of loss of connection to earth due to use of temporary cable connections, risks arising from the connection to different national and local electricity

distribution networks, impracticality of establishing an equipotential zone external to the unit, open-circuit faults of the PEN conductor of PME supplies raising the potential of all metalwork (including that of the unit) to dangerous levels, risk of shock arising from high functional currents flowing in protective conductors, and vibration while the vehicle or trailer is in motion, or while a transportable unit is being moved – causing faults within the unit installation.

Some of the requirements to reduce these risks include:

Regulation 717.411.1 Automatic disconnection shall be by RCD.

Regulation 717.411.3.1.2 Accessible conductive parts of the unit to be connected through the main equipotential bonding to the main earth terminal within the unit.

Regulation 717.514 Identification

adjacent to the supply inlet:

- (i) The type of supply which may be connected.
- (ii) The voltage rating of the unit.
- (iii) The number of phases and their configuration.
- (iv) The on board earthing arrangements.
- (v) The maximum power required by the unit.

Persons involved in mobile or transportable units will need to refer to section 717 of the 17th edition of the Wiring Regulations.

Fairgrounds, amusement parks and circuses

This Section specifies the minimum electrical installation requirements to facilitate the safe design, installation and operation of temporary erected mobile or transportable electrical

machines and structures which incorporate electrical equipment. The machines and structures are intended to be installed repeatedly, without loss of safety, temporary, at fairgrounds, amusement parks, circuses or similar places. The permanent electrical installation is excluded from the scope. This section does not apply to the internal electrical wiring of the machines.

For detailed requirements of this section please refer to the specific article concerning fairgrounds, amusement parks and circuses in this edition of *Wiring Matters*.

More information.

Important: this article only considers a small number of changes expected in the 17th Edition. For more information refer to IET website, www.theiet.org ■