The provision of information within BS 7671 Part II

by Jon Elliott

Part one of this article, which appeared in the last issue of *Wiring Matters*, looked at the requirements within BS 7671 relating to the provision of information considered necessary for the safe and effective use of electrical installations. In this part we will be concentrating on those requirements relating to the provision of information which apply to safety services; special installations and locations; and inspection, testing, certification and reporting.

Safety services

Within BS 7671, Chapter 56 contains requirements for safety services such as emergency lighting, fire detection and alarm systems and industrial safety systems. Regulation 560.7.5 requires that any switchgear and controlgear should be clearly identified to indicate its purpose. Such clear identification is essential as switch/controlgear for emergency services must be placed in a location where it is only accessible by skilled or instructed persons. This may, in many cases result in it being placed remotely from the equipment or circuits being controlled. It is a general requirement that the purpose of each device provided to act as an isolator is, as a result of its physical location or through labelling, clearly understandable (537.2.2.6 refers). As such, except for the most straightforward of installations, it will be necessary to label or otherwise identify both the isolator and the item of equipment wherever an isolator is placed remote to the item of equipment being controlled.

In many cases, arrangements for safety services may need to be understood or, in the case of fire rescue service lifts and communications systems, operated by persons who are not familiar with the building or the installation therein. As a result Chapter 56 contains a number of requirements designed to make the information necessary for the safe and proper use of safety services readily available. These requirements are described below:

- Full details should be given of all electrical safety services within the building or location and should be displayed close to the relevant distribution board (560.7.9 refers). This information should be conveyed as clearly as possible and as such a single line schematic diagram would be sufficient in some cases.
- Any drawings relating to the

safety services should be displayed at the origin of the installation. These drawings should clearly identify the location of

- All items of electrical control equipment and distribution boards. Any equipment identification designations used should be clearly stated on the drawings
- each item of safety equipment. The particulars and purpose of each item of equipment and the relevant individual circuit identification designation being clearly stated
- any special switching or monitoring equipment associated with a power supply for a safety service including visual or audible warning equipment (560.7.10 refers)

- A schedule of all items of current using equipment (as defined in Part 2 of BS 7671) which is connected to the safety power supply. Characteristics such as rated current (as defined), starting time and starting current should be stated for each item. Where convenient, this information may be given on the circuit diagrams.
- The operating instructions for all items of safety equipment and electrical safety services should be made readily available. These instructions should be specific to the actual installation in question as an aid to the operation of the safety services therein (560.7.12 refers).

It will of course be necessary to comply with the requirements of other relevant standards relating to safety services too. By way of example, BS 5839-1: 2002 (2008) *Fire detection and fire alarm systems for buildings – Part 1: Code of practice for design, installation, commissioning and maintenance*.) contains a number of requirements pertinent to this article such as:

- With the exception of the main isolator serving the whole building, any isolator or protective device that could be used to isolate the supply to the fire alarm system should be clearly labelled:
  - "FIRE ALARM" where a protective device not containing a switch serves only the fire alarm system.
  - "FIRE ALARM. DO NOT SWITCH OFF" where a switching device, whether incorporating a protective device or not, serves only the fire alarm system.
  - "WARNING. THIS SWITCH ALSO CONTROLS THE SUPPLY TO THE FIRE ALARM SYSTEM" where a switch disconnects the supply to both the fire alarm system and other circuits (clause 25.2 f refers).
- Clause 40 requires adequate records and other documentation to be provided to the user or purchaser. This would include certificates covering the design, installation and commissioning of the alarm system; an operation and maintenance manual for the system; as fitted drawings and a log book in which to record maintenance and testing activities, fire alarm signals and false alarms.
- Clause 41 covers the certification requirements for the design, installation, and commissioning of the installation

Inspection and testing

An electrical installation should be subjected to inspection and testing both during construction and on completion before being taken into service to confirm that the relevant requirements of BS 7671 have been met (610.1 refers). It should also be subjected to periodic re-inspection and testing to confirm, so far as is reasonably practicable, that the installation remains in a satisfactory condition for continued service (621.1). Whenever inspection and testing is carried out it is very important that the person carrying out the work has access to the relevant information about the installation such as, in the case of initial verification, details relating to the design including the methods of protection employed, schedules for distribution circuits and boards and details of any installed equipment which might suffer damage or cause misleading readings to be given during testing (610.2). In the case of periodic inspection and testing, the inspector should have access to the Electrical Installation Certificate (EIC) relating to the original installation, the relevant certification - whether further Electrical Installation Certificates or Minor Works Certificates - to cover additions and alterations made after the original installation was completed and also the reports covering any periodic inspection and testing carried out previously (621.1).

Where a person carrying out inspection and testing has access to the results of previous inspection and

testing it becomes possible for them, by comparison of results, to observe signs of deterioration which may have occurred over time such as, for example, a trend showing falling insulation resistance which might indicate mechanical damage or material deterioration to the insulation of a cable, or a marked increase in conductor resistance which is perhaps a symptom of a poor connection caused by corrosion within a terminal or a loose connection or similar.

Whilst carrying out an inspection on an installation, regulation 611.3 states that the inspection should confirm the presence of the following forms of identification, labelling or similar

- identification of conductors
- labelling of protective devices, switches and terminals
- provision of danger signs and other warning signs where required
- provision of diagrams, instructions and similar information

On completion of the initial verification of an installation or changes to an existing installation an Electrical Installation Certificate and schedule(s) of inspection and schedule(s) of test results should be produced and given to the person ordering the work (631.1; 632.1). Where the work carried out does not include the provision of a new circuit, a Minor Works Certificate may be issued to cover the work (631.3). On completion of a periodic inspection a Periodic Inspection Report and schedule(s) of inspection and schedule(s) of test results should be produced and given to the person ordering the inspection (631.2; 634.1). In each case, the certificate, report and schedules should be based upon the model forms contained in Appendix 6.

Special installations and locations

Part 7 of BS 7671 contains requirements specific to special installations and locations which supplement or modify the general requirements (700 refers). Within Part 7 there are a number of requirements of relevance to this article and these are considered below.

Swimming pools

Regulation 702.410.3.4.1 permits the installation of socket-outlets within zone 1 of a location containing a swimming pool supplied by either SELV or electrical separation, in both instances the source of which being installed beyond zones 0 and 1 unless protected by a 30 mA RCD or by automatic disconnection of supply with additional protection provided by 30 mA RCD. However wherever a socket-outlet is so located, a notice must be installed to inform persons carrying out maintenance or cleaning that any equipment connected via the socket-outlet may only be used when the pool is not occupied by people.

Agricultural and horticultural premises

Regulation 705.514.9.3 requires that the user of the installation be provided with a plan indicating the location of all installed electrical equipment and the routing of any concealed cables. Knowledge of the routing of buried cables is particularly important in agricultural premises as virtually any area of unpaved or

INSTRUCTIONS FOR ELECTRICITY SUPPLY

BERTHING INSTRUCTIONS FOR CONNECTION TO SHORE SUPPLY

This marina provides power for use on your pleasure craft with a direct connection to the shore supply which is connected to earth. Unless you have an isolating transformer fitted on board to isolate the electrical system on your craft from the shore supply system, corrosion through electrolysis could damage your craft or surrounding craft.

ON ARRIVAL

(i) Ensure the supply is switched off and disconnect all current-using equipment on the craft, before inserting the craft plug. Connect the flexible cable **firstly** at the pleasure-craft inlet socket and **then** at the marina socket-outlet.

(ii) The supply at this berth is * V, * Hz. The socket-outlet will accommodate a standard marina plug colour * (technically described as BS EN 60309-2, position 6 h).

(iii) For safety reasons, your craft must not be connected to any other socket-outlet than that allocated to you and the internal wiring on your craft must comply with the appropriate standards.

(iv) Every effort must be made to prevent the connecting flexible cable from falling into the water if it should become disengaged. For this purpose, securing hooks are provided alongside socket-outlets for anchorage at a loop of tie cord.

(v) For safety reasons, only one pleasure-craft connecting cable supplying one pleasure craft may be connected to any one socket-outlet.

(vi) The connecting flexible cable must be in one length, without signs of damage, and not contain joints or other means to increase its length.

(vii) The entry of moisture and salt into the pleasure-craft inlet socket may cause a hazard. Examine carefully and clean the plug and socket before connecting the supply.

(viii) It is dangerous to attempt repairs or alterations. If any difficulty arises, contact the marina management.

BEFORE LEAVING

(i) Ensure that the supply is switched off and disconnect all current-using equipment on the craft, before the connecting cable is disconnected and any tie cord loops are unhooked.

(ii) The connecting flexible cable should be disconnected **firstly** from the marina socket-outlet and **then** from the pleasure-craft inlet socket. Any cover that may be provided to protect the inlet from weather should be securely replaced. The connecting flexible cable should be coiled up and stored in a dry location where it will not be damaged.

unmetalled surface may be subjected to ploughing over either in connection with crop production or as a way to recover tracks and access ways to a more usable condition for vehicles. Regulation 705.522 specifies minimum depths at which buried cables should be installed, in the case of areas not comprising arable or cultivated ground the minimum specified depth is 0.6 m with added mechanical protection. However, it is not inconceivable that successive ploughing in such areas could result in a penetration of the ground to such a depth, in which case virtually no amount of mechanical protection would resist the force produced by a tractor...

A typical agricultural and horticultural premises will consist of a number of separate buildings. The electrical installation in each building or distinct separate part thereof should be protected by a single isolation device (705.537.2 refers). Furthermore any circuits which provide a supply to circuits which are only used seasonally at for example harvest time should be provided with an isolator which disconnects all live conductors when operated. Any isolators so provided should be clearly marked to indicate which building or part of the installation they control.

Where high density livestock rearing is employed and where the supply of food, water, air or lighting cannot be ensured in the event of a power supply failure, a secure source of supply should be arranged typically in the form of a back-up supply (705.560.6 refers). Where electrically powered ventilation is required in such cases it is necessary to install either temperature and supply voltage monitoring, or a standby source of supply such as a generator having sufficient capacity to allow an adequate level of ventilation to be maintained. Where a standby source is selected, a notice must be posted adjacent to it making it clear that it should be subjected to testing periodically in accordance with manufacturer's instructions.

Marinas and caravans

Persons berthing vessels in marinas or using caravans are viewed as ordinary persons as defined in BS 7671. That is to say they are seen as being neither electrically skilled nor sufficiently instructed to avoid the dangers which electricity may create. As a result, BS 7671 recommends that marina operators provide user instructions to any persons making use of the electrical supply points provided (fig 709.3 note 1 refers). Fig 709.3 of Section 709 is an example set of instructions for the connection of vessels to supply points in marinas and is reproduced above.

In the case of caravans regulation 721.514.1 requires that instructions for use be provided to allow the caravan to be used safely. These instructions should include information relating to the function and use of the integral test button of the RCD – this requirement could be met by posting the RCD notice described in 514.12.2 at the consumer unit - and the use of the main isolating switch. It also requires the posting of the user instructions for connection and disconnection as given in fig 721 of Section 721. Regulation 721.537.2.1.1.1 requires these user instructions to be posted near the main isolation switch inside the caravan which effectively means next to the consumer unit.

Annex A to Section 721 contains guidance on the use of extra-low voltage d.c. installations associated with caravans. This annex is informative and as such does not contain requirements. It does however contain a number of recommendations regarding instructions for use in A721.514.1 and warning notices to be displayed on or near the auxiliary battery compartment in A721.55.3.5 and A721.55.3.7.

Exhibitions, shows and stands

An emergency switch should be provided for circuits used to supply signs, lamps or exhibits in such installations. This switch should be easily visible, accessible and the items controlled by each switch clearly stated (711.559.4.7 refers).

Solar photovoltaic power supply systems

It is extremely problematic to make dead all parts of a solar photovoltaic power supply system – particularly between the PV array (as defined) – more commonly referred to as a solar panel – and the device providing isolation before the PV convertor as some degree of generation will occur at any level of ambient light. For this reason, regulation 712.537.2.2.5.1 requires all junction boxes on PV arrays and the PV generator (an installation comprising a number of PV arrays) to carry a warning label stating that parts therein may remain live after operation of the isolator before the PV convertor.

Mobile and transportable units

These units are in many cases capable of being connected to a very wide range of supplies. In order to make possible their safe connection to a supply, and hence enable their safe use, instructions for connection should be posted, preferably close to the supply inlet connector(s) detailing:

- the unit's earthing arrangement
- the type of supply/supplies which may be connected to the unit
- the unit's voltage rating
- the number of phases of the installation within the unit and the phase configuration
- the unit's maximum power requirement ■