MARINAS AND JETTIES

We review the requirements for electrical installations in marinas, examining the risks associated and future European-level developments for inland navigation vessels

By Geoff Cronshaw

SECTION 709 of BS 7671 contains requirements for marinas and similar locations. This is based on European CENELEC Harmonisation Document HD 60364-7-709.

Most, if not all, of the measures used to reduce the risks in marinas may equally apply to electrical shore connections for inland navigation vessels using the network of navigable rivers and canals throughout Europe, for which CEN is developing a standard.

One of the major differences between supplies to small craft in a typical marina and those required for electrical shore connections for European inland navigation vessels is the size of the supply which may be required. For example, seagoing vessels accessing river navigations can be up to 10,000 gross tonnes and motor barges and tugs used on inland waterways in Europe are considerably larger than the average size of vessel berthed in marinas; these are generally recreational craft (up to 24m length) or work boats and small commercial vessels and fishing boats.

Generally socket outlets with a rating of 16A will be provided for each craft in a marina. The risks associated with electrical installations in marinas, such as the presence of water, movement of structures and harsh environmental conditions, are the same as for electrical shore connections for larger inland navigation vessels.

In this article we summarise some of the existing key requirements for electrical installations in marinas and similar locations. The CEN requirements for electrical shore connections for larger inland navigation vessels are expected to be very similar to those in CENELEC HD 60364-7-709 and there is a joint working group set up to address convergence of the requirements.

Protection against electric shock

The protective measures of obstacles, placing out of reach, non-conducting location and protection by earth-free local equipotential bonding, are not permitted in section 709 (of BS 7671) for marinas. These measures are contained in Sections 417 and 418 of BS 7671:2008, and are not for general application. The protective measures of section 417 provide basic protection only, and are for application in installations controlled or supervised by skilled or instructed persons. The fault protective provisions of Section 418 are special and, again, subject to control and effective supervision by skilled or instructed persons.

Supplies

Regulation 709.313.1.2 states that the nominal supply voltage of the installation for the supply to small vessels, recreational crafts or houseboats shall be 230V a.c. single-phase, or 400V a.c. three-phase. It is important to note that where the supply system is protective multiple-earthed (PME), Regulation 9(4) of the Electricity Safety, Quality and Continuity Regulations 2002 prohibits the connection of a combined neutral and protective conductor to any metalwork of a caravan or boat.

Operational conditions and environmental factors

Electrical equipment to be installed on or above jetties, wharves, piers or pontoons must be selected according to the external influences that may be
Cables should be selected and installed so that mechanical damage due to tidal and other movement of craft and other floating structures is prevented. To clarify this requirement, cables should be installed so that they are protected from damage due to:

- displacement by movement of craft or other structures;
- friction, tension or crushing;
- exposure to adverse temperatures.

At locations where cables are subject to flexing, flexible cables should be used, such as:

- cross-linked insulated flexible cables harmonised type H07RN-F, H07EN4-F or H07RN6-F (insulated and sheathed), e.g. cables to Tables 14, 15, 16, 17 and 20 of BS 719:2001;
- thermosetting insulated flexible cables harmonised type H07Z-K, e.g. cables to BS 7211: Table 3d within flexible wiring systems.

Note 2 Take care when installing cables to prevent damage from abrasion due to movement between pontoon sections, etc. Cables must be adequately fixed, protected and supported, and, if necessary, cable types suitable for flexing must be used.

Distribution boards, feeder pillars and socket outlets

Socket outlets when mounted on floating installations or jetties should be fixed above the walkway and preferably not less than 1 m above the highest water level. This may be reduced to 300 mm if appropriate additional measures are taken to protect against the effects of splashing (IPX4), but care should be taken to avoid creating a low-level obstacle which may cause risk of tripping on the walkway. When mounted on fixed jetties they should be mounted not less than 1 m above the highest water level.

Galvanic corrosion

The immersion of metal components of a craft in water, particularly in salt water, provides the natural mechanism of galvanic corrosion. Where there are dissimilar metals on the electrochemical series in proximity, the detrimental effect of galvanic couples can be exacerbated. As a countermeasure, small vessels, recreational craft, houseboats, ships and many immersed metal structures are provided with sacrificial anodes (zinc for salt water) to which the more valuable/essential immersed parts, such as propellers, shafts, hull fittings and fixings are electrically bonded.

There have also been reports of increased rate of depletion of the sacrificial anodes of recreational craft which are connected on a longer-term basis to shore supplies. Some observers believe this is associated with the connection of the recreational craft’s protective earth terminal (to which the more valuable/essential immersed parts) with sacrificial anodes (zinc for salt water) to which the more valuable/essential immersed parts, such as propellers, shafts, hull fittings and fixings are electrically bonded.

Conclusion

This article only gives an overview of electrical installations in marinas and similar locations. For more information refer to section 709 of BS 7671:2008 incorporating Amendment 1. Be aware that requirements for electrical shore connections for inland navigation vessels are still at a very early stage of discussion and may or may not become a European standard.