part four
electrically propelled vessels

Figure of Eight

The particular risks related to electric boats are mainly due to the presence of large banks of batteries and associated charging equipment. Hydrogen, a highly flammable gas that is lighter than air, is the by-product of battery charging. This part of the Standards focuses mainly on minimising the risk of hydrogen causing a fire or explosion.

This can be achieved by making sure that batteries are stored securely in a ventilated area, that the propulsion motor is securely installed and that controls can be operated from the steering position. It is also important to ensure that your battery charging equipment and controller compartments are adequately ventilated.

This chapter applies to all electrically propelled boats.

You might think that the weight of a big bank of batteries would keep them in a secure position. Not so according to reports gathered from accidents. Batteries can shift around as a result of the boat tipping in a lock or at a mooring when the water level drops. It shouldn't be surprising either that unsecured batteries on your boat can move when negotiating a roundabout on the back of a trailer! [4.2]

electrical installation

Fires can be caused by sparks igniting flammable gases or by cables overheating. To help reduce these risks it's essential that you comply with Part Three of these Standards, where applicable. It's also recommended that your electrical installation complies with the appropriate British Standards and with the Institution of Electrical Engineers (I.E.E.) Regulations for the Electrical and Electronic Equipment of Ships, where relevant. [4.1]

battery arrangements

Hydrogen and air can be a very explosive mixture and especially towards the end of a charging cycle when significant quantities of hydrogen can be given off by the bank of batteries. To reduce the risk of a build-up of gas, leading to an explosion, batteries must be properly stowed and adequately ventilated. It's recommended that your battery stowage and ventilation arrangements comply with the I.E.E. Regulations for the Electrical and Electronic Equipment of Ships, where relevant. [4.2]

propulsion motor

If electrical connections are damaged they could spark, which could ignite nearby fuel, such as Liquified Petroleum Gas. To minimise this risk the propulsion motor must be securely installed, so that its electrical connections cannot be accidentally damaged. [4.3]

reversing

To help control whilst manoeuvring, every boat must have an effective means of reversing which can be operated from the steering position. [4.4]

Batteries must be secured in order to prevent movement and damage, which, for example, could detrimentally affect the operation of other vital systems. By securing batteries in the proper way you can also prevent accidental battery terminal contact with conducting material, which could cause a spark. This also helps ensure that electrolyte is not spilt. [4.2]

master switch

An electrical fault on your boat could cause sparks or overheating cables, which in turn could ignite flammable materials or gases. In the event of such a fault, you must be able to disconnect the electrical system by means of a master switch. A manually operated master switch needs to be positioned so that it can be operated from the steering position. It must be capable of cutting off the electrical supply to the propulsion motor. [4.5]

battery charger connection

Fires can be caused by overheated cables, which can come about if the cables don't have adequate capacity for carrying the current. To reduce the risk of this happening, the connection from the battery charger on the boat to the charging point on shore must be via a three-core flexible cable of adequate current carrying capacity and of suitable construction and grade. This will ensure the cables can carry the full electrical load continuously.

To protect the cables from water damage it's advisable to ensure that connectors comply with the splash-proof category of BS EN 60309 Part 2. Having splash-proof cable connections will greatly reduce the risk of electric shocks. [4.6]

Batteries can be secured by the battery boxes themselves if they are a rigid and a fixed part of the boat and allow no more than 10mm movement laterally. Alternatively batteries can be secured by using a strap of insulating material to hold them down. [4.2]

Built-in mains battery chargers must be suitable for the marine environment they are used in. Most examiners recommend that the charger is connected to the boat via a “CEEFORM” blue 16A fixed male plug, similar to the ones used in caravans, and that the charging lead uses a “CEEFORM” free female socket on its boat end to avoid anyone’s fingers coming into contact with live connectors. [4.6]

battery charging panel

To reduce the risk of the battery charging panel overheating, it must be adequately ventilated to allow any heat produced during charging to escape.

To minimise the risk of overheating cables, or short circuits, it’s recommended that you fit a manually-operated switch which isolates the battery charger from the incoming a.c. supply.

It’s also a good idea to have an indicator light on your charging panel that shows when the boat’s batteries are charging. [4.7]

battery charging

Hydrogen and air can be an explosive combination if ignited. Having a ventilation fan that can automatically discharge the hydrogen gas that is produced when the batteries charge can minimise this risk. If a ventilation fan is fitted it must automatically switch on when the batteries start to charge and continue to run for one hour after the battery charging cycle has been completed. [4.8]

ventilation of motor & controller compartments

Overheating of the motor or controller compartments could cause a fire. For this reason the motor and controller compartments must be adequately ventilated. [4.9]

Need more help or advice? Contact the Electric Boat Association – www.electric-boat-association.org.uk and refer to Standards 4.1-4.9 in the appendix, page 9.

part four checklist

4.1	electric propulsion installation complies with Part 3 of these Standards	☐
	electric propulsion installation complies with British Standards	☐
	electric propulsion installation complies with IEE Regulations	☐
4.2	*batteries stowed in accordance with IEE Regulations*	☐
	batteries adequately ventilated	☐
4.3	propulsion motor securely installed	☐
4.4	propulsion motor has an effective means of reversing	☐
	propulsion motor has an effective means of reversing operable from steering position	☐
4.5	master switch fitted	☐
	master switch disconnects supply to propulsion motor	☐
	master switch operable from steering position	☐
4.6	charging leads have 3 core flexible cable	☐
	charging leads of adequate current carrying capacity	☐
	charging leads of suitable construction and grade	☐
	charging leads splash-proof to BS EN 60309 Part 2	☐
4.7	charging panel adequately ventilated	☐
	charging panel has a positive switch fitted	☐
	charging panel has a warning light fitted	☐
4.8	battery-exhaust ventilation fan on automatic switch	☐
4.9	motor compartment adequately ventilated	☐
	controller compartment adequately ventilated	☐

Check List items in bold are Mandatory
Check List items in italic are Advisory

*EXEMPTION AVAILABLE