Electrical Safety Rules — study guide

The ship's Electrical Safety Rules exist to stop electrical work becoming an accident. They are designed to work alongside the ship's Risk Assessment Process and Permit to Work System, and they define the voltage bands, the roles, the isolation rules and the specialised equipment used on board.[13]

Voltage definitions

Extra low voltage does not exceed 50 V AC between conductors, or between any conductor and earth.[2] **High voltage** is a voltage greater than 1,000 V AC or 1,500 V DC between conductors, or greater than 600 V AC or 900 V DC between conductors and earth.[12] A risk assessment must always be carried out when working on live control and telecommunications plant and equipment, even at extra low voltage.

Regulatory basis and roles

Guidance for electrical safety on board comes from SOLAS Chapter II-1, Part D (Electrical Installations).[1] The **Master** is responsible for the seaworthiness, navigation, cargo and maintenance of the vessel and for compliance with mandatory regulations. The **Chief Engineer** is responsible for the technical management of the vessel and reports to the Master. The **Electro-Technical Officer (ETO)** is responsible for the safe and efficient operation and maintenance of all electrical plant and equipment, and keeps records, manuals and technical drawings correct and usable, including regular inspections of power management systems.[3] The ETO, Chief Engineer and Master are the roles directly involved in electrical safety.

Safe use of equipment

All equipment should be suitable for its purpose, properly maintained, and used in line with the manufacturer's guidelines. All equipment should undergo regular inspection and maintenance. In a hazardous area — one where explosive gas or air mixtures are or may be present in quantities needing special precautions for the construction and use of electrical apparatus — gas testing must always be carried out before and during electrical work.[1]

Isolation and lock out

Electrical isolation is the disconnection and separation of equipment from every source of electrical energy, in such a way that the separation is secure. All electrical equipment must be regarded as live until proven dead, and an isolation must be secured with a suitable locking device. The purpose of a lock out system is to make it impossible to de-isolate equipment without the proper authority and the correct procedure being followed. Low-voltage equipment is earthed by applying portable earthing leads.

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Precautions by voltage

When working on low-voltage systems, all equipment must be proved dead by testing, barriers must be erected to stop unauthorised persons entering, and danger notices must be attached to the equipment or system. Before testing can be completed on high-voltage equipment, a **Sanction for Test** document is required.

PPE and specialist equipment

Wearing the correct PPE can prevent serious injury, and electrical personnel must work within the Permit to Work System. Specialist electrical safety equipment includes insulated mats and insulated shepherd's crooks. Work on telecommunications equipment has its own rules: non-magnetic tools must be used when testing or fault-finding near strong magnetic fields, and any work on antenna or aerial tuning units must be isolated to the same standard as electrical equipment so they cannot be energised.

Hazards

The most common electrical-work hazards are electrocution, electric shock, electrical fires, and fire or explosion from ignition of flammable gas, liquid or vapour. Battery bank systems bring explosive gases during charging and corrosive materials. Static electricity is a particular hazard with grit-blasting equipment and rotating equipment. **PAT testing** is the testing of portable (appliance) equipment.

Key facts to remember

- Extra low voltage: ≤50 V AC. High voltage: >1,000 V AC / 1,500 V DC between conductors, or >600 V AC / 900 V DC to earth.
- Rules work with the Risk Assessment Process and the Permit to Work System.
- ETO runs electrical plant and records; Chief Engineer (technical management) reports to the Master.
- Treat everything as live until proven dead; isolate securely with a locking device (lock out).
- Low-voltage: prove dead, erect barriers, attach danger notices. High voltage: Sanction for Test before testing.
- Specialist kit: insulated mats, insulated shepherd's crooks. Static: grit blasting and rotating equipment.
- Battery banks: explosive gases during charging plus corrosive materials.

Sources

1. SOLAS Chapter II-1, Part D — Electrical installations (construction, machinery and electrical installations).
2. IEC 60092 series — Electrical installations in ships (voltage bands and safe practice).
3. STCW Convention and Code — electro-technical officer functions (Section A-III/6) and watchkeeping/engineering standards.