



NIRDESH

NATIONAL INSTITUTE FOR R&D IN DEFENCE SHIPBUILDING

(An autonomous society under the Ministry of Defence)

NIRDESH ADVISORY – 02

Ref: NIRDESH/ADVISORY/02/2016-17

Date: 20 July 2016

ELECTRICAL SAFETY IN SHIPYARDS

1. Shipyards in general and ships under construction/repair in particular are potential hot spots for electrical hazards. Widespread usage of electrical systems on ships under construction/repair and workshops with metal flooring and mostly wet conditions increase the risk of electric shocks. Primary injury from electric shock and secondary injury from reflexive actions could have serious implications on the victim. Most common electrical hazards are electrocution, burns and electrical shock. In addition, short circuits leading to fires/explosion may also occur.

2. Electrical safety is important to improve overall safety scenario in shipbuilding/ship repair yards. This advisory highlights measures to be adopted by personnel working in shipyards/repair yards and ships under construction/repair to ensure electrical safety.

WARNING SIGNS

3. **Lookout for the following and take corrective actions to improve Electrical Safety:-**

- Damaged or frayed cables or wires, especially, on portable electric tools, extension cords, shore power cables, portable lighting, and permanent shipboard wiring. Specific examples include: broken, cut, or worn insulation caused by circuit overloads, weathering, chemical damage and impact/abrasion.
- Unconnected or broken *ground* wires of electrical equipment, cords, and/or tools.
- Broken, loose or frayed power supply connectors and plugs.
- Loose connections resulting in intermittent sparks.
- Electrical panel covers not fitted, loosely fitted, rusted, damaged or left open resulting in water ingress during monsoon and exposed electrical connections.
- Frequent tripping and abnormal heating and vibration of electrical equipment.
- Cable runs on the ground or deck may get damaged due to overrunning of vehicles, trolleys, etc and by stepping of personnel using the area. Exposed current carrying conductors can cause shocks and sparks.



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- Cable runs on low lying ground/ trenches/bilge areas may get submerged due to water logging.
- Sharp bends, pinch points and strain in cable runs.
- Personnel working with electrical systems without Personal Protective Equipment.
- Unauthorised and temporary power supply tapping, especially for hand tools, blowers and temporary lighting.
- Not practicing Safety Tag out or Lock out system for isolation of power supply prior to commencing work in electrical systems.
- Overhead power lines in the way of cranes and large items being transported.
- Lack of knowledge of electrical hazards and safe practices, especially among sub-contracted workforce.

REMEDIAL MEASURES

4. Following corrective actions and precautions are recommended to overcome the risks listed above:-

- Repair or replace damaged power cables.
- Avoid loose connections and attend to loose connections and sparks immediately.
- Ensure that ground wires are connected and tested prior to starting work with electrical equipment.
- All panel covers should be fully closed and covered.
- Frequent tripping and abnormal heating and vibration of equipment are indications of overload and defects. Such equipment should be taken out of service till the defect is identified and repaired.
- Workers must avoid working on energised circuits except in cases where it is absolutely necessary and even in those cases, they should work under supervision.
- Cable runs should be routed, elevated from ground or deck. They must be held by dedicated 'Tree' like structures or hung using 'S' hooks from already existing structures. These arrangements will preserve health of the cables in addition to preventing accidents.



- Cable trenches, if available, must be well drained and should remain dry at all times. Avoid cable runs through wet bilges.
- Cable runs should be arranged so that sharp bends, pinch points and strain on the cable are avoided.
- **Personal Protective Equipment** such as gloves, safety boots, helmets, safety goggles, etc are to be worn while working with electrical equipment. Rubber insulation mats should be used around switch boards and other heavy duty panels. Major electrical consumers must be properly earthed. Avoid working with electrical equipment in wet conditions.
- Unauthorised temporary power supply tapplings or connections are not to be used.
- Safety Tag-Out or Lock-Out system should be used to completely isolate power supply and to create a safe working environment.
- Operation of cranes and routes for shifting large items should be planned and supervised to avoid contact with overhead power lines.
- All personnel involved in ship building and repairs, irrespective of trade or specialisation, must be regularly educated about electrical hazards and safe working practices. Training sessions should include demonstrations and analysis of accidents and case studies.

STEPS TO ELECTRICAL SAFETY

5. Four simple steps, if followed rigorously and religiously, can ensure electrical safety in shipbuilding/ship repair.

- Create an electrical safe working condition by conforming to promulgated safety standards and procedures.
- Train employees to recognise and avoid potential hazards.
- Plan the task, properly and well in advance.
- Select and use appropriate personal protective equipment.

Note: Inputs for above guidelines have been provided by Warship Electrical Overseers.